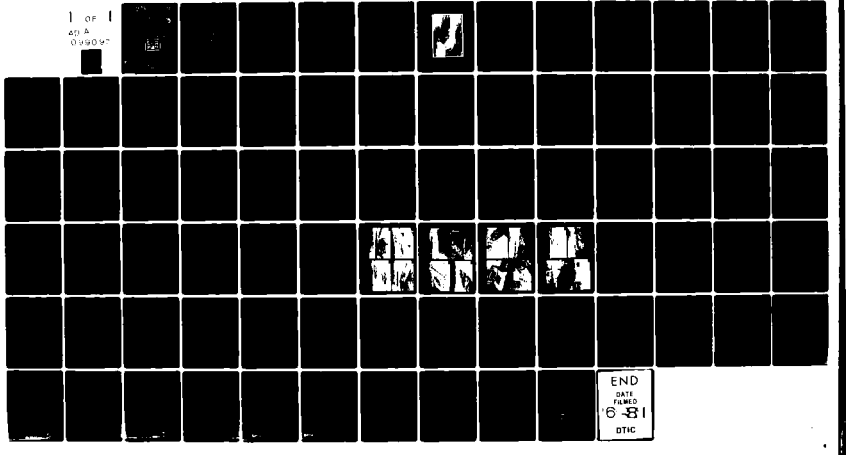
AD-A099 097 ACKENHEIL AND ASSOCIATES INC PITTSBURGH PA F/G 13/13
NATIONAL DAM INSPECTION PROGRAM. SILT POND A, (NDI NUMBER PA 00--ETC(U)
MAR 81 DACW31-81-C-0027
UNCLASSIFIED NL



LEVEL II

(12)

AD A099097

OHIO RIVER BASIN,
PIGEON CREEK,
WASHINGTON COUNTY,

PENNSYLVANIA.

NDI No. PA 00823

PENN DER No. 63-77

DTIC ELECTE MAY 18 1981 C D

(6) National Dam Inspection Program.

SILT POND A,
(NDI Number PA 00823 PENN DER Number 63-77).

UNITED STATES STEEL CORPORATION
RAW MATERIALS DIVISION

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

(15) DACW31-81-C-0027

PREPARED FOR

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
BALTIMORE, MARYLAND 21203

(12) 81

BY

MACKENHEIL & ASSOCIATES GEO SYSTEMS, INC.
CONSULTING ENGINEERS
1000 BANKSVILLE ROAD
PITTSBURGH, PENNSYLVANIA 15216

(11) MARCH 1981

DTIC FILE COPY

*Original contains color plates: All DTIC reproductions will be in black and white.

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

81 5 18 028

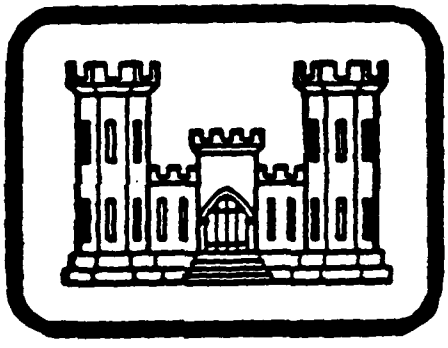
(14) 4L785

OHIO RIVER BASIN

SILT POND A
WASHINGTON COUNTY, COMMONWEALTH OF PENNSYLVANIA
NDI NO. PA 00823
PennDER NO. 63-77

UNITED STATES STEEL CORPORATION

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



Prepared for: DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

Prepared by: ACKENHEIL & ASSOCIATES GEO SYSTEMS, INC.
Consulting Engineers
1000 Banksville Road
Pittsburgh, Pennsylvania 15216

Date: March 1981

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams for Phase I investigations. Copies of these guidelines may be obtained from the Department of the Army, Office of Chief of Engineers, Washington, D.C. 20314.

The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon visual observations and review of available data. Detailed investigations and analyses involving topographic mapping, subsurface investigations, materials testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify the need for such studies which should be performed by the owner.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of the dam depends on numerous and constantly changing internal and external factors which are evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some time in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I investigations are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Design Flood is based on the estimated "Probable Maximum Flood" (PMF) for the region (greatest reasonably possible storm runoff), or fractions thereof. The Spillway Design Flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

SYNOPSIS OF ASSESSMENT AND RECOMMENDATIONS

NAME OF DAM:	Silt Pond A
STATE LOCATION:	Pennsylvania
COUNTY LOCATION:	Washington
STREAM:	Unnamed tributary to Pigeon Creek.
DATE OF INSPECTION:	4 December 1980
COORDINATES:	Lat. 40°11'18", Long. 79°59'36"

ASSESSMENT

Based on a review of available design information and visual observations of conditions as they existed on the date of the field inspection, the general condition of Silt Pond A is considered to be good.

This assessment is based primarily on visual observations of the embankment and appurtenances, and hydrologic/hydraulic analyses of reservoir/spillway capacity.

The structure is classified as a "small" size, "high" hazard dam. Corps of Engineers guidelines recommend one-half to one times the Probable Maximum Flood (PMF) as the Spillway Design Flood for a "small" size, "high" hazard dam. Silt Pond A's Spillway Design Flood is the Probable Maximum Flood. Spillway capacity is "adequate" because the non-overtopping flood discharge was found, by using the HEC-1 computer program, to be in excess of 100 percent of the PMF.

The field inspection indicated three minor deficiencies which can be corrected or improved through implementation of the following recommended evaluation, remedial and/or maintenance efforts.

RECOMMENDATIONS

1. Emergency Operation and Warning Plan: The owner should develop an Emergency Operation and Warning Plan including:

   a. Guidelines for evaluating inflow during periods of heavy precipitation or runoff.

   b. Procedures for around the clock surveillance during periods of heavy precipitation or runoff.

SYNOPSIS OF ASSESSMENT AND RECOMMENDATIONS (CONT'D)
Silt Pond A

c. Procedures for drawdown of the reservoir under emergency conditions.

d. Procedures for notifying downstream residents and public officials, in case evacuation of downstream areas is necessary.

2. Remedial Work: The Phase I investigation of Silt Pond A disclosed three minor deficiencies which should be corrected. The recommended remedial work should include:

a. Backfilling the animal burrow on the right reservoir slope just upstream of the dam;

b. Removal of vegetal debris from the trash cages on the active inlet port over the outlet structure; and

c. Improving the surface drainage through the swampy area below the embankment's toe.

Samuel G. Mazzella — Date
Project Engineer

James P. Hannan — Date
Project Engineer

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
James Ellsworth Barrick, II
ENGINEER
No. 022639-E

James E. Barrick, P.E. — Date
PA Registration No. 022639-E

Approved by: 5 MAY 81
Date
JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

SILT POND A

OVERVIEW

TABLE OF CONTENTS

TABLE OF CONTENTS (CONT'D)

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
SILT POND A
NATIONAL I. D. NO. PA 00823
PennDER No. 63-77

SECTION 1
PROJECT INFORMATION

1.1 GENERAL

a. Authority: This Phase I investigation was performed pursuant to authority granted by Public Law 92-367 (National Dam Inspection Act) to the Secretary of the Army through the Corps of Engineers, to conduct inspections of dams throughout the United States.

b. Purpose: The purpose of the investigation is to make a determination on whether or not the dam constitutes a hazard to human life or property.

1.2 DESCRIPTION OF PROJECT

a. Dam and Appurtenances:

(1) Embankment: Silt Pond A was designed and constructed as a earthfill structure with clay core and cutoff along the centerline. The embankment is about 400 feet long, with a toe to crest height of 38.9 feet and a crest width ranging from 15 to 20 feet. The embankment's upstream slope was observed to be 2.7H:1V above the erosion protection blanket and 1.9H:1V in the blanket zone. The downstream slope was observed to be 3.2H:1V.

(2) Principal Spillway: The principal spillway for Silt Pond A consists of a 16 inch diameter stainless steel pipe through the embankment skewed to the centerline.

The intake structure consists of numerous 18 inch diameter steel elbows (90 degrees) welded to the conduit. These inlet ports are positioned so that discharge can be maintained as the bottom of the reservoir rises due to the deposition of sediments carried by runoff from the upstream refuse area.

The outlet control structure lies at the toe of the embankment and consists of a reinforced concrete valve house that contains a 16 inch gate valve.

(3) Pond Drain: The intake ports of the principal spillway riser act as a pond drain for this facility.

(4) Emergency Spillway: The emergency spillway is a 48 foot wide, trapezoidal open channel located on the left abutment. The channel is lined with cobble-sized sandstone erosion protection.

(5) Freeboard Conditions: Freeboard between the low point on the embankment and the emergency spillway crest is 3.5 feet. The pool level, at the time of inspection, was 19.1 feet below the emergency spillway overflow crest .

(6) Downstream Conditions: The unnamed creek below Silt Pond A flows through a relatively narrow, steep-sided valley for about 1.3 miles to a confluence with Pigeon Creek at Hazel Kirk, Pennsylvania. Pigeon Creek enters the Monongahela River near Monongahela, Pennsylvania. In the first 1.3 miles below Silt Pond A, at least seven inhabited dwellings lie on the floodplain.

(7) Reservoir: Silt Pond A's reservoir is about 1100 feet long at the emergency spillway crest elevation and has a surface area of about 4.4 acres. When the pool is at the crest of the dam, the reservoir length increases to 1300 feet and the surface area is about 6.6 acres.

(8) Watershed: The watershed contributing to Silt Pond A is a grass and brushland. The watershed is owned by the U. S. Steel Corporation.

b. Location: Silt Pond A is located in Carroll Township, Washington County, Pennsylvania approximately 3 miles west of Monongahela, Pennsylvania.

c. Size Classification: The dam has a maximum storage capacity of about 55 acre-feet and a toe to crest height of 38.9 feet. Based on the Corps of Engineers guidelines, this dam is classified as a "small" size structure.

d. Hazard Classification: Silt Pond A is classified as a "high" hazard dam. In the event of a dam failure, at least seven inhabited dwellings could be subjected to substantial damage and loss of more than a few lives could result.

e. Ownership: Silt Pond A is owned by the United States Steel Corporation, Raw Materials Division, Frick District. Correspondence can be addressed to:

United States Steel Corporation
Raw Materials Division, Frick District
Fayette Bank Building, 5th FLoor
Uniontown, Pennsylvania 15401
Attention: Mr. Robert Witt, Jr., Chief Engineer
(412) 438-3511, Ext. 256

f. Purpose of Dam: Silt Pond A was constructed to serve as a holding and settling impoundment for surface runoff from the proposed Refuse Area II immediately upstream of the site. The impoundment is part of the U. S. Steel Maple Creek Mine complex.

g. Design and Construction History: The dam was designed by the U. S. Steel Corporation in 1973. The embankment and appurtenances were constructed by the Great Lakes Construction Company of Cleveland, Ohio in 1977. No additional information on design or construction was found.

h. Normal Operating Procedure: Silt Pond A was designed to operate as an uncontrolled structure. Under normal operating conditions, the pool level (operating pool level) is maintained by the principal spillway.

1.3 PERTINENT DATA

a. Drainage Area — 0.23 sq. mi.

b. Discharge

Maximum Flood at Dam Facility	Unknown
Emergency Spillway Capacity at Top of Dam	971 cfs

c. Elevation (feet above MSL)

Design Top of Dam	1045.0*
Current Top of Dam (average)	1045.3
Current Top of Dam (low point)	1042.9
Emergency Spillway Overflow Crest	1039.4
Operating Pool	Varies
Operating Pool on Date of Inspection	1020.3
Principal Spillway Inlet Invert	Varies
Principal Spillway Outlet Invert	1004.0
Toe of Embankment	1004.0

d. Reservoir Length

Length of Maximum Pool	1300 feet
Length of Normal Pool	1100 feet
Length of Current Operating Pool	300 feet

e. Reservoir Storage

Design Top of Dam	68 acre-feet*
Current Top of Dam	55 acre-feet
Emergency Spillway Invert	37 acre-feet

f. Reservoir Surface

Design Top of Dam	6.6 acres
Current Top of Dam	5.7 acres
Emergency Spillway Crest	4.4 acres

g. Embankment

Type	Earth*
Length	400 feet
Height**	38.9 feet
Crest Width	Varies from 15 to 20 feet
Slopes	
Downstream	3.2H:1V
Upstream	2.7H:1V to 1.9H:1V
Impervious Core	Yes*
Cutoff Provisions	Yes*
Grout Curtain	None*

h. Emergency Spillway

Type	Trapezoidal Open Channel
Location	Left Abutment
Overflow Crest Length	48 feet
Crest Elevation	1039.4 feet

i. Principal Spillway

Type	16 inch Diameter Stainless Steel Pipe*
Location	Through Embankment
Inlet Invert	Varies
Trash Cage	Yes
Conduit Length	270 feet*
Gate Valve	Downstream
Anti-Seep Collars	Yes, 12*

---

* Taken or derived from available engineering drawings or reports.

** Based on Current Top of Dam (average) of 1045.3.

SECTION 2
ENGINEERING DATA

2.1 DESIGN

a. Design History: The initial Silt Pond A design was prepared by the owner's engineering personnel and an Encroachment Permit was issued in 1973. The permit was subsequently recalled by the Department of Environmental Resources and design information sufficient to support issuance of a dam permit was requested. A permit to construct and maintain Silt Pond A was issued on 19 November 1973.

b. Data Available: Data available for review included:

(1) The contents of PennDER files consisting of correspondence between owner's representatives and state personnel, the owner's hydrologic and stability calculations, a dam permit and state report on the proposed structure, and miscellaneous correspondence between local residents and state personnel.

(2) Design drawings and contract specifications prepared by United States Steel Corporation that were provided to the field inspection team by the owner.

(3) Discussions with a company representative during performance of the Silt Pond A field inspection.

2.2 CONSTRUCTION

a. Constructor: The dam was constructed between February 1977 and October 1977 by Great Lakes Construction Company of Cleveland, Ohio.

b. Modification: There were no reported modifications to the structure after its completion.

2.3 OPERATION

a. Dam: The dam was designed to operate without a dam tender and no operational data is available.

b. Principal Spillway: The principal spillway requires periodic attention because of the constantly rising level of sediment in the impoundment. As the silt level rises, successive inlet ports of the principal spillway intake structure are sealed off. Consequently, only a small amount of free water is impounded at any given time. The inlet ports are sealed when there is insufficient free water in the impoundment to permit adequate settling of silt.

c. Emergency Spillway: The emergency spillway is an uncontrolled open channel on the left abutment. It does not require the attention of operating personnel and needs only periodic maintenance.

2.4 EVALUATION

a. Availability: Information was obtained from the Pennsylvania Department of Environmental Resources and was supplemented by drawings, specifications, and information obtained from a representative of United States Steel Corporation.

b. Adequacy: The available design information supplemented by field inspection and supporting engineering analyses presented in succeeding sections is adequate for the purposes of this Phase I Inspection Report.

c. Validity: There appears to be no reason to question the validity of the available design information and drawings.

SECTION 3
VISUAL INSPECTION

3.1 FINDINGS

a. General: The field inspection of Silt Pond A was performed on 4 December 1980, and consisted of:

(1) Visual observations of the embankment crest and slopes, groins and abutments;

(2) Visual observations of the principal and emergency spillways including intake structures, outlet structures, and approach and discharge channels;

(3) Visual observations of the embankment's downstream toe area including drainage channels and surficial conditions;

(4) Visual observations of downstream conditions and evaluation of the downstream hazard potential;

(5) Visual observations of the reservoir shoreline and watershed;

(6) Transit stadia surveys of relative elevations along the embankment crest centerline, spillways, and across the embankment slopes.

The visual observations were made during periods when the reservoir and tailwater were at normal operating levels.

The visual observations checklist, field plan, profiles and sections containing the observations and comments of the field inspection team are contained in Appendix A. Specific observations are illustrated on photographs in Appendix C. Detailed findings of the field inspection are presented in the following sections.

b. Embankment:

(1) Crest: The crest of the embankment was straight and approximately level and had a uniform covering of gravel-size sandstone fragments with some vegetation growing through.

(2) Upstream Slope: The upstream slope of the embankment appeared to be generally uniform and contained a blanket of cobble sized sandstone erosion protection to within 5 feet of the crest. Above the erosion protection, the upstream slope was fully vegetated with Crownvetch. There were no observed indications of erosion or instability of the upstream slope of the embankment.

(3) Downstream Slope: The downstream slope of the embankment appeared to be generally uniform and contained a heavy vegetal covering of Crownvetch. The lowest portion of the embankment was covered with a blanket of cobble-sized sandstone erosion protection.

There were no indications of erosion or instability of the embankment's downstream slope.

c. Abutments: The left and right abutments were cleared of trees and contained a uniform covering of Crownvetch. There were no indications of seepage, erosion, or instability on either of the embankment's abutments.

d. Principal Spillway:

(1) Intake Structure: The principal spillway intake structure appeared to be in good condition. No significant rusting of the conduit was observed and the concrete foundation slab contained no large cracks or extensive concrete deterioration.

The trash cage that protects the lowest visible inlet port was partially clogged with debris and vegetal matter.

The steel staircase that provides access to the inlet ports was in good condition.

(2) Control Structure: The principal spillway control structure was in good condition with no significant signs of cracking or deterioration of the concrete surfaces. Steel components were either painted or had only minor surface rust.

The gate valve appeared to be in good condition but was not activated (closed) to check its operability.

(3) Conduit: The exposed portion of the principal spillway conduit (in the control structure at the toe of the dam) was in good condition. No significant rusting or deterioration of the pipe was noted.

(3) Outlet Structure: The principal spillway outlet structure appeared to be in good condition. There was no observed significant cracking or deterioration of the concrete headwall, wingwall or slab. The steel grate had only surficial rusting. The lower portion of the grate was partially clogged with small debris and vegetal matter, but performance of the conduit was not significantly affected.

(4) Discharge Channel: The principal spillway discharge channel immediately below the outlet structure was lined with cobble-sized sandstone erosion protection. Below the toe of the dam, the channel is in natural earth and was lined with grass and small weeds. No significant erosion was observed in the reach immediately below the dam.

e. Outlet Works: Silt Pond A does not have a [illegible] outlet works facility because the impoundment zone is intended to collect and store sediment from the watersh d above.

f. Emergency Spillway:

(1) Approach Channel: The emergency spillway approach channel was free of obstructions that would reduce the capacity of the spillway.

(2) Overflow Crest: The broad crested weir type overflow was generally level and unobstructed.

(3) Discharge Channel: The emergency spillway discharge channel contained no obstructions that would reduce the capacity of the spillway. The channel had a generally uniform width and slope.

The downstream end of the spillway is turned 90 degrees and discharge is onto the hillside below the dam.

(4) Erosion Protection: The emergency spillway was lined with a blanket of cobble-sized sandstone erosion protection for its entire length. The erosion protection was in good condition and no erosion was observed. Some vegetation was growing through the rocks.

g. Reservoir:

(1) Slopes: The slopes of the reservoir were observed to be moderately steep and uniformly covered with brush and small trees. No indications of significant instability of reservoir slopes was observed.

Some erosion of the reservoir slope was observed below the discharge point of the left watershed diversion ditch.

(2) Inlet Stream: The inlet stream is a natural channel that was heavily vegetated with brush and small trees.

(3) Sedimentation: None observed.

(4) Watershed: On the date of the field inspection, the watershed contributing to Silt Pond A was almost completely undeveloped and consisted mostly of wooded and brush covered lands. No significant erosional or excavational areas were noted in the watershed. There were no visual indications of mining operations within the watershed.

Most of the watershed is circumscribed by a large drainage ditch that discharges to the impoundment zone immediately upstream of the dam.

h. Downstream Conditions:

(1) Downstream Channel: A swampy area exists adjacent to the downstream channel just below the toe of the dam. The cause(s) of the swamp could not be determined but poor surface drainage appeared to be a consideration.

The downstream channel below Silt Pond A passes through a 42 inch concrete pipe culvert beneath a township road just below the dam. Approximately 1,000 feet below the dam, the channel passes through a 48 inch concrete pipe culvert and discharges immediately into an 8 foot by 8 foot concrete box culvert beneath the Norfolk and Western Railroad tracks.

The natural channel below the dam is generally winding and heavily vegetated.

(2) Floodplain Conditions: In the first 7,000 feet below Silt Pond A, at least seven inhabited dwellings lie on the floodplain at elevations low enough to possibly be imperiled by high flows.

3.2 EVALUATION

The following evaluations are based on the results of the visual inspection performed on 4 December 1980.

a. Embankment: The condition of Silt Pond A embankment was good. No deficiencies were observed anywhere on the upstream or downstream slopes or the crest of the embankment.

b. Principal Spillway: The principal spillway appeared to be in good condition and functioning properly. Some minor clogging of trash cages on the inlet and outlet structures was noted.

c. Emergency Spillway: The emergency spillway was in good condition. No significant deficiencies were noted.

d. Hazard Potential: Based on the observed downstream floodplain conditions, Silt Pond A was assigned a "high" hazard potential rating.

SECTION 4
OPERATIONAL FEATURES

4.1 PROCEDURE

Reservoir pool level is maintained by the intake ports of the principal spillway. Normal operating procedure does not require a dam tender but periodic closure of the intake ports is required to maintain an acceptable discharge water quality. The principal spillway is controlled by a gate valve at the downstream toe of the embankment. Upstream control can be accomplished by closing the intake ports.

The emergency and principal spillways operate in an uncontrolled manner and do not require a dam tender.

4.2 MAINTENANCE OF DAM

The embankment and appurtenances are maintained by the United States Steel Corporation. Maintenance reportedly consists of periodically repairing eroded areas and making miscellaneous repairs as necessary.

4.3 INSPECTION OF DAM

The United States Steel Corporation is required by the State of Pennsylvania to inspect the dam annually and make needed repairs.

The United States Steel Corporation is required by the Mining Safety and Health Administration (MSHA) to inspect the dam at least once every seven days and to make an annual report and certification of the dam.

4.4 WARNING SYSTEM

There is no warning system and no formal emergency procedure to alert or evacuate downstream residents upon the threat of a dam failure.

4.5 EVALUATION

The maintenance program should be continued. However, there are no written operation, maintenance or inspection procedures, nor is there a warning system or formal emergency procedure for this dam. These procedures should be developed in the form of checklists and step by step instructions, and should be implemented as necessary.

SECTION 5
HYDROLOGY AND HYDRAULICS

5.1 EVALUATION OF FEATURES

a. Design Data: Silt Pond A has a watershed of 147 acres which is vegetated primarily by grass and brushland. The watershed is about 3600 feet long and 2000 feet wide and has a maximum elevation of 1260 feet (MSL). At maximum normal pool, the dam impounds a reservoir with a surface area of 4.4 acres and a storage volume of 37 acre-feet. Maximum normal pool level is maintained at Elevation 1039.4 by the overflow crest of the emergency spillway. The impoundment has a principal spillway conduit with an upstream invert at Elevation 1008.0. For the purpose of this hydrologic analysis, the principal spillway was assumed to be inoperative.

Design spillway capacity and embankment freeboard were made sufficient to accommodate 1500 cubic feet per second per square mile which was considered sufficient for this structure and watershed at the time of design. Silt Pond A's actual spillway capacity, for the observed crosssection and existing freeboard conditions, was computed to be 971 cfs.

No additional hydrologic calculations were found relating reservoir/spillway performance to the Probable Maximum Flood or fractions thereof.

b. Experience Data: Records are not kept of reservoir level or rainfall amounts. There is no record or report of the embankment ever being overtopped.

c. Visual Observations: On the date of the field inspection, no serious deficiencies were observed that would prevent the principal or emergency spillways from functioning. The water level at the time of the field inspection was observed to be 19.1 feet below the emergency spillway crest. The owner's representative reported that the water level observed was the normal operating pool level and that it has remained at that elevation for some time. There were no indications of significant sedimentation.

d. Overtopping Potential: Overtopping potential was investigated through the development of the Probable Maximum Flood (PMF) for the watershed and the subsequent routing of the PMF and fractions of the PMF through the reservoir and spillway. The Corps of Engineers guidelines recommends one-half to one times the Probable Maximum

Flood for "small" size, "high" hazard dams. Based on the observed size and existing downstream conditions, Silt Pond A was assigned a Spillway Design Flood (SDF) of one PMF.

Hydrometeorological Report No. 33 indicates the adjusted 24 hour Probable Maximum Precipitation (PMP) for the subject site is 19.4 inches. No calculations exist that relate the reservoir/spillway system to a PMP type precipitation event. Consequently, an evaluation of the system was performed to determine whether or not the dam's spillway capacity is adequate under current Corps of Engineers' guidelines.

The Corps of Engineers, Baltimore District, has directed that the HEC-1 Dam Safety Version computer program be utilized. The program was prepared by the Hydrologic Engineering Center (HEC), U.S. Army Corps of Engineers, Davis, California, July 1978. The major methodologies and key input data for this program are discussed briefly in Appendix D.

The peak inflow to Silt Pond A was determined by HEC-1 to be 690 cfs for the SDF.

An initial pool elevation of 1039.4 was assumed prior to commencement of the storm.

e. Spillway Adequacy: The capacity of the combined reservoir and spillway system was determined to be in excess of the PMF by HEC-1. According to Corps of Engineers' guidelines, Silt Pond A's spillway is "adequate."

SECTION 6
STRUCTURAL STABILITY

6.1 AVAILABLE INFORMATION

a. Design and Construction Data: All available design documentation, calculations and other data received from the Pennsylvania Department of Environmental Resources were reviewed. This data is discussed in Section 2 and a detailed listing is included in Appendix B. The owner provided the drawings that are presented in Appendix E.

b. Operating Records: There are no written operating records or procedures for this dam.

c. Post Construction Changes: There are no reported post construction modifications to the embankment.

d. Visual Observations:

(1) Embankment: Visual observations made during the field inspection did not indicate evidence of a high ground water level in the embankment. There was no pronounced "line of seepage", and no springs, seeps or surface sloughs were observed. The crest of the embankment was straight and had a uniform covering of gravel-size sandstone fragments. The upstream slope appeared to be generally uniform and contained a blanket of cobble-sized sandstone erosion protection to within 5 feet of the embankment crest. Above this, the slope was fully covered by Crownvetch.

The downstream slope was generally uniform and contained a heavy vegetal cover of Crownvetch.

The lowest portion of the embankment was covered with a blanket of cobble-sized sandstone.

There were no indications of erosion or instability of the embankment's downstream slope.

(2) Outlet Facilities: Observations of visible components of the principal spillway gave no indication of instability.

(3) Emergency Spillway: Observation of the emergency spillway gave no indication of instability.

e. Performance: There has been no indication or report of any problems with the performance of this embankment over its three-year life.

6.2 EVALUATION

a. Design Documents: The design documentation was by itself, considered inadequate to evaluate the structure.

The stability analysis performed for this embankment utilized the "friction circle" method of analysis. All parameters were assumed either from text books or from an analysis performed on a nearby embankment. The calculations conclude "The relationship of developed cohesion to maximum cohesion gives a safety factor of 2.91". Analyses were not found concerning the end of construction steady seepage nor earthquake loading conditions.

b. Embankment: Based on the visual observations of embankment slopes, materials, seepage and ground water conditions, Silt Pond A appeared to have an adequate margin of safety against sliding.

c. Spillways: Based on the visual observations, the principal and emergency spillway structures for Silt Pond A appeared to be stable.

d. Seismic Stability: According to the Seismic Risk Map of the United States, Silt Pond A is located in Zone 1 where damage due to earthquakes would most likely be minor.

A dam located in Seismic Zone 1 may be assumed to present no hazard from an earthquake provided static stability conditions are satisfactory and conventional safety margins exist. However, no calculations were developed to verify this assessment.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS

7.1 ASSESSMENT

a. Evaluation:

(1) Embankment: Silt Pond A's embankment is considered to be in good condition. This is based on visual observations that revealed no deficiencies.

(2) Principal Spillway: The condition of the principal spillway is considered to be good. The facility was observed to have only minor deficiencies and appeared to be functioning properly.

(3) Emergency Spillway: The condition of the emergency spillway is considered to be good. This is based on its "adequate" capacity rating determined using the HEC-1 computer program and its observed satisfactory physical condition.

(4) Emergency Plans: The lack of a documented emergency operation and warning plan is considered to be a deficiency.

b. Adequacy of Information: The information available on design, construction, operation and performance history in combination with visual observations and hydrology and hydraulic calculations was sufficient to evaluate the embankment and appurtenant structures in accordance with the Phase I investigation guidelines.

c. Urgency: The recommendations presented in Section 7.2a and 7.2b should be implemented immediately.

d. Necessity for Additional Studies: None.

7.2 RECOMMENDATIONS

a. Emergency Operation and Warning Plan: The owner should develop an Emergency Operation and Warning Plan including:

(1) Guidelines for evaluating inflow during periods of heavy precipitation or runoff.

(2) Procedures for around the clock surveillance during periods of heavy precipitation or runoff.

(3) Procedures for drawdown of the reservoir under emergency conditions.

(4) Procedures for notifying downstream residents and public officials, in case evacuation of downstream areas is necessary.

b. Remedial Work: The Phase I investigation of Silt Pond A disclosed three minor deficiencies which should be corrected. The recommended remedial work should include:

(1) Backfilling the animal burrow on the right reservoir slope just upstream of the dam;

(2) Removal of vegetal debris from the trash cages on the active inlet port over the outlet structure; and

(3) Improving the surface drainage through the swampy area below the embankment's toe.

APPENDIX A

VISUAL INSPECTION CHECKLIST

VISUAL OBSERVATIONS CHECKLIST I
(NON-MASONRY IMPOUNDING STRUCTURE)

Name Dam Silt Pond A County Washington State Pennsylvania National ID # PA 00823

Type of Dam Earth Hazard Category High

Date(s) Inspection 4 December 1980 Weather Clear, cool Temperature 40°F

Pool Elevation at Time of Inspection 1020.3 (MSL)
Tailwater at Time of Inspection 1007 ± (MSL)

Inspection Personnel:

J. E. Barrick, P.E.	Ackenheil & Associates, Project Manager and Hydrologist
J. P. Hannan	Ackenheil & Associates, Geotechnical Engineer
S. G. Mazzella	Ackenheil & Associates, Civil Engineer
J. D. Floris	U. S. Steel Corporation, Owner's Representative
C. A. Woodward	Pennsylvania Department of Environmental Resources

Recorder J. E. Barrick

GEO Project G80138-C
PennDER I.D. No. 63-77

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None observed.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	The embankment crest appeared to be straight and was level throughout the central portion of the dam. The crest rose slightly at the right abutment where an access road approached the dam. The crest dipped slightly at the left end of the embankment where it approached the emergency spillway.	
RIPRAP FAILURES	None observed.	
SETTLEMENT	None observed.	
JUNCTION OF EMBANKMENT AND ABUTMENT	The junction of the embankment and the abutment, both upstream and downstream, appeared to be in good condition. No erosion or indications of instability were observed.	

EMBANKMENT (CONTINUED)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND SPILLWAY	The junction of the embankment and spillway was in good condition. No erosion or indications of instability were observed. The junction was covered by a blanket of cobble-sized sandstone erosion protection.	
ANY NOTICEABLE SEEPAGE	None.	
STAFF GAUGE AND RECORDER	None observed.	
DRAINS	None observed.	
SURFICIAL CONDITIONS	The embankment's upstream slope was covered with a blanket of cobble-sized sandstone erosion protection that rose to within 5 feet of the crest. Above the blanket, the upstream slope was heavily vegetated with Crownvetch. The embankment crest was surfaced with sandstone gravel. Some vegetation was growing on the embankment crest. The embankment's downstream slope was generally uniform and covered entirely by a dense growth of Crownvetch. The lowest portion of the embankment's downstream slope had a blanket of cobble-sized sandstone erosion protection. No erosion or indications of instability were observed.	
TOE AREA	A swampy area was observed on the floodplain just below the principal spillway outlet structure. Origin of the water could not definitely be determined, but surficial drainage from the right abutment area appeared to be a significant contributor to the wet conditions.	

PRINCIPAL SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
INTAKE STRUCTURE	The principal spillway intake structure was in good physical condition. The inlet ports were not heavily rusted and appeared to be operational. The trash cage on the lowest inlet port was partially clogged by debris. The concrete slab foundation had no major cracks or evidences of concrete deterioration. The steel staircase access to the inlet ports was in good condition with only minor surface rust observed.	
CONTROL STRUCTURE	The principal spillway control structure appeared to be in good condition. No significant cracks or deterioration of concrete surfaces were observed and steel components had only surficial rust. The gate valve control was not activated and appeared to be in good condition.	
CONDUIT	The only visible portions of the principal spillway conduit were observed in the control structure and at the outlet structure. The conduit appeared to be in good condition.	
OUTLET STRUCTURE	The principal spillway outlet structure appeared to be in good condition. No significant cracking was observed in the concrete headwall, wingwall or slab structure. The steel grate appeared to be in good condition.	

PRINCIPAL SPILLWAY (CONTINUED)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
OUTLET STRUCTURE (continued)	The lower portion of the grate was partially clogged by vegetal growth, but the obstruction did not appear to seriously hinder the conduit performance.	
DISCHARGE CHANNEL	The principal spillway discharge channel immediately below the outlet structure was lined with cobble-sized sandstone erosion protection. Below this, the channel consisted of natural ground with vegetated sides. No serious erosion was observed at or below the outlet works structure.	
EMERGENCY GATE	None observed.	

EMERGENCY SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
APPROACH	The approach channel to the emergency spillway was free of large debris and obstructions that might significantly reduce the spillway capacity.	
OVERFLOW SECTION	The emergency spillway overflow crest was generally level and free of major obstructions.	
DISCHARGE CHANNEL	The discharge channel below the crest of the embankment was clear and free of obstructions that might hinder discharge past the embankment. At the lower end of the discharge channel, the flow is turned approximately 90 degrees and directed onto the hillside below the dam.	
LINING	The emergency spillway was lined with a blanket of cobble-sized sandstone erosion protection. The blanket appeared to be uniform and no erosion of stone was observed. Some vegetation was growing through.	

INSTRUMENTATION

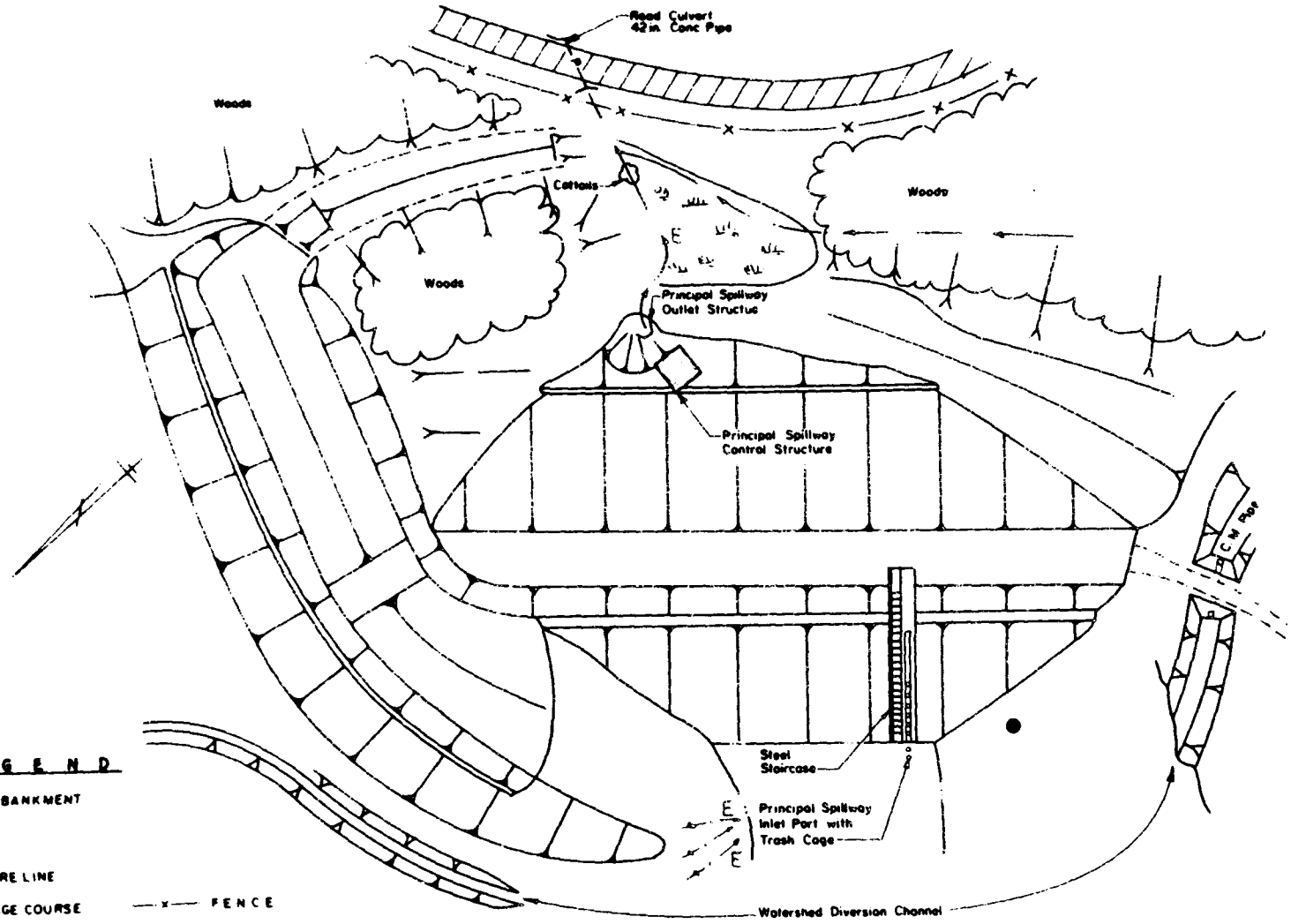
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None observed.	
WEIRS	None observed.	
PIEZOMETERS	None observed.	
OBSERVATION WELLS	None observed.	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The reservoir slopes were observed to be moderately steep and generally vegetated by brush and small trees. There were no indications of significant instability anywhere within the impoundment zone. Some erosion was noted on the left, below the discharge point of the watershed diversion ditch.	
SEDIMENTATION	None observed.	
INLET STREAM	Natural channel lined with considerable underbrush and small trees.	
WATERSHED	The watershed was mostly undeveloped, consisting of woodland, brushland and two inhabited dwellings. Most of the watershed is encircled by a diversion ditch that discharges to the impoundment zone immediately upstream of the dam's abutments.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The downstream channel below the dam flows beneath a township road through a 42 inch diameter concrete pipe. Below this, the channel passes through a narrow, relatively steep-sided valley that contains considerable trees and underbrush. Approximately 1,000 feet below the dam, the downstream channel passes through a 48 inch diameter concrete pipe and immediately enters an 8 foot by 8 foot concrete box culvert beneath the Norfolk and Western Railroad tracks.	
APPROXIMATE NUMBER OF HOMES AND POPULATION	In the first 7,000 feet below the dam there are at least seven inhabited dwellings on the floodplain at elevations low enough to possibly be imperiled by high flows.	

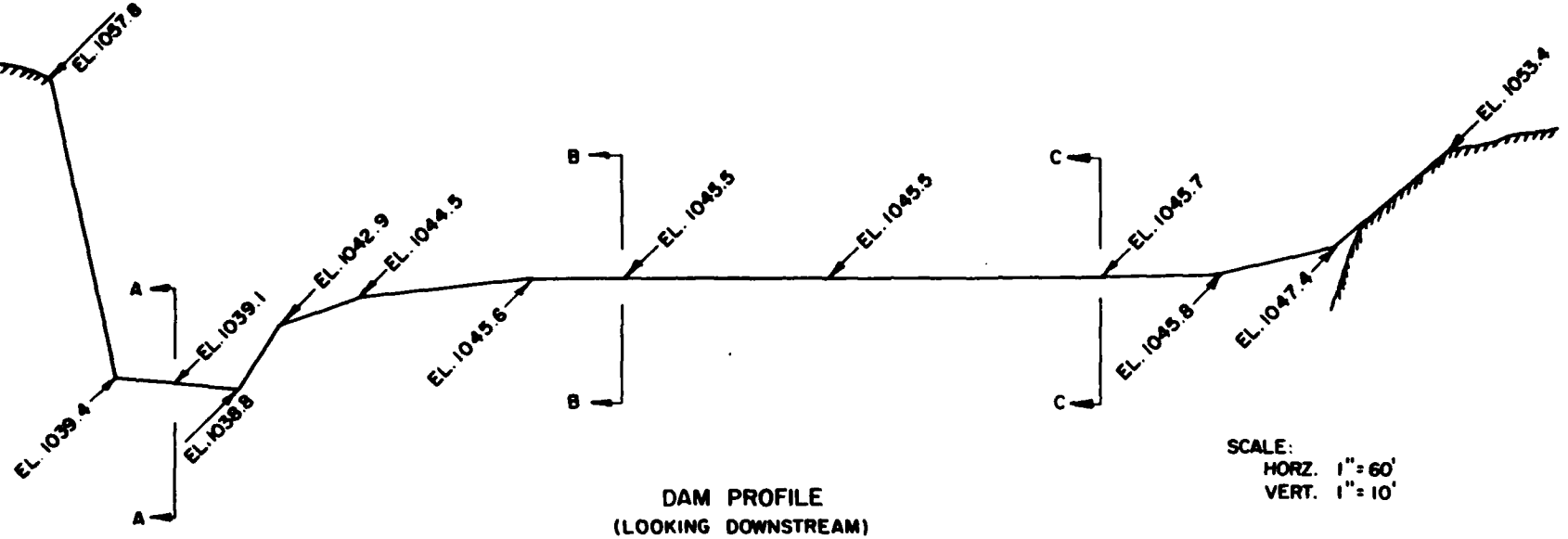


LEGEND

- IMPOUNDING EMBANKMENT SLOPE
- OTHER SLOPE
- STREAM OR SHORE LINE
- SURFACE DRAINAGE COURSE
- CONCRETE STRUCTURE
- FOOT PATH OR TRAIL
- E EROSION
- SWAMP OR MARSH
- x FENCE
- GROUND HOG HOLE
- P PIPELINE

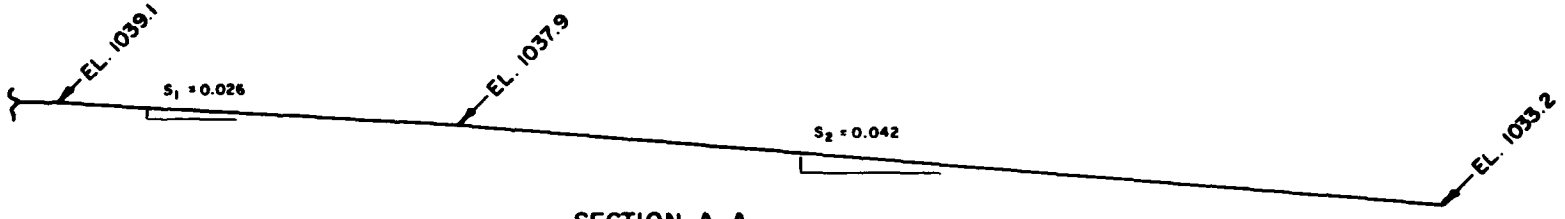
DATE: MARCH 1981	SILT POND A NATIONAL DAM INSPECTION PROGRAM	FIELD SKETCH
SCALE: NONE		
DR: JF CK: JEB	ACKENHEIL & ASSOCIATES CONSULTING ENGINEERS GEO SYSTEMS, INC. 1000 BANKSVILLE RD. / PITTSBURGH PA 15216	
DWG. NO. 80138C-1		

A10



DAM PROFILE
(LOOKING DOWNSTREAM)

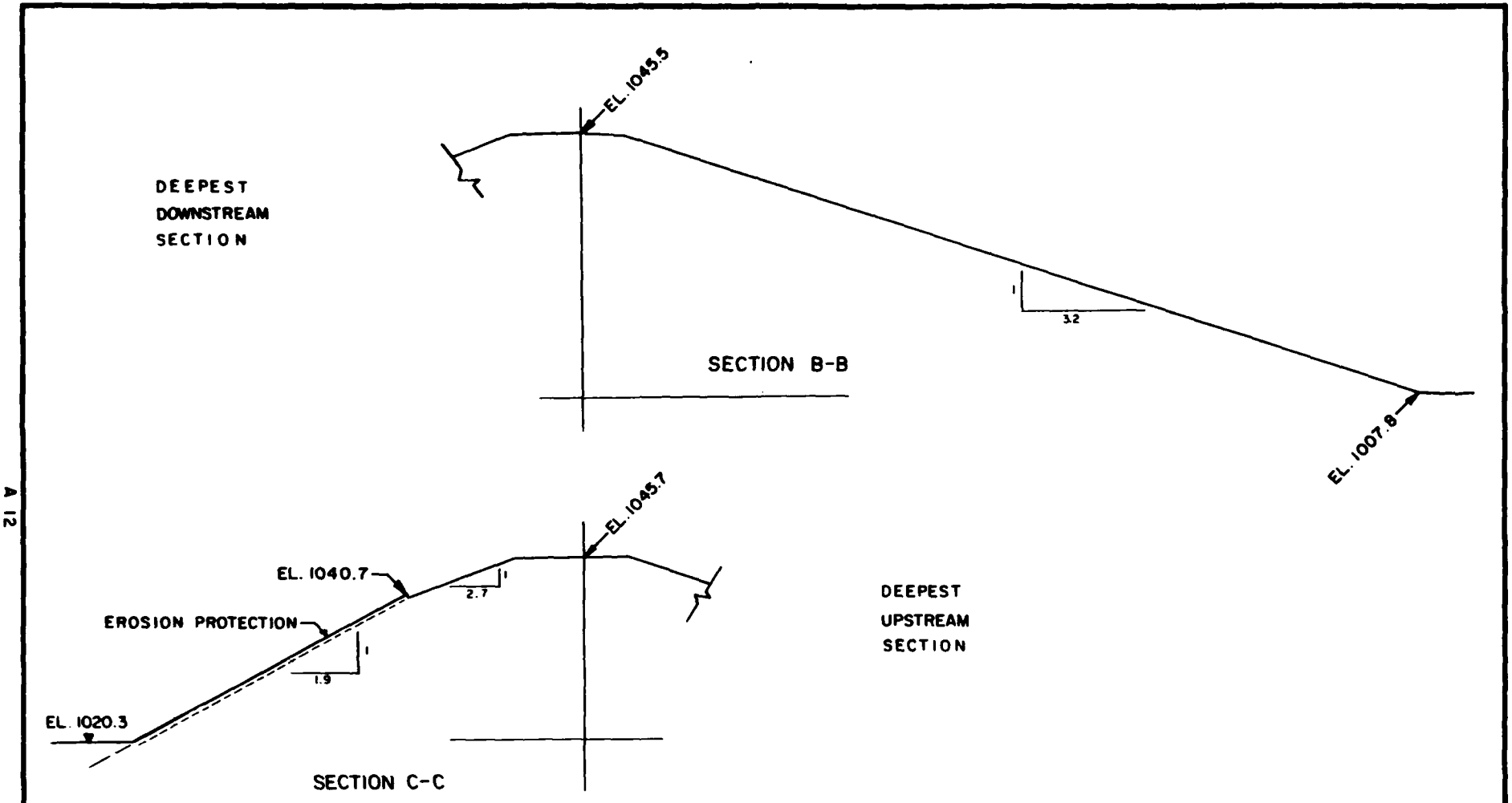
SCALE:
HORZ. 1" = 60'
VERT. 1" = 10'



SECTION A-A
(EMERGENCY SPILLWAY)

SCALE:
HORZ. 1" = 20'
VERT. 1" = 10'

DATE: MARCH 1981		SILT POND A NATIONAL DAM INSPECTION PROGRAM	FIELD PROFILE and SECTION
SCALE: AS SHOWN			
DR: JF	CK: JEB	ACKENHEIL & ASSOCIATES CONSULTING ENGINEERS GEO SYSTEMS, INC. 1000 BANKSVILLE RD./PITTSBURGH, PA 15216	
DWG. NO. 80138C-2			



DATE: MARCH 1981		SILT POND A NATIONAL DAM INSPECTION PROGRAM	FIELD SECTIONS
SCALE: 1"=20'			
DR: JF	CK: JEB	ACKENHEIL & ASSOCIATES CONSULTING ENGINEERS GEO SYSTEMS, INC. 1000 BANKSVILLE RD./PITTSBURGH, PA 15216	
DWG. NO. 80138C-3			

APPENDIX B

ENGINEERING DATA CHECKLIST

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Silt Pond A
NDI No.: PA 00823

ITEM	REMARKS
**Design Drawings	Drawing 52-A-9A Sheet 1, Ginger Hill Refuse Area #2, dated 8/3/76 Drawing 73-Q-26 Sheet No. 29, Typical Embankment Section and Plan of Decant Location, dated 9/13/76 with revisions 5/21/77 and 6/1/77 Drawing 73-Q-26 Sheet No. 39, South Pond Spillway and Details, dated 11/8/76 Drawing 73-Q-26 Sheet No. 40, Typical Embankment Sections, dated 10/20/76 with revision 3/31/77
**As-Built Drawings	See Design Drawings above.
Regional Vicinity Map	U.S.G.S. 7-1/2 minute Monongahela, Pennsylvania Quadrangle Map.
*Construction History	Constructed by Great Lakes Construction Company between February 1977 and 31 October 1977.
**Typical Sections of Dam	See Design Drawings above.

ITEM	REMARKS
**Outlets-Plan Details Constraints Discharge Ratings	See Design Drawings above.
Rain/Reservoir Records	None available.
*Design Reports	"Report on the Application of the United States Steel Corporation" undated, by the Chief Dams Section, Division of Dams and Encroachments, Pennsylvania Department of Environmental Resources.
Geology Reports	None available.
*Design Computations	See Hydrology and Hydraulics and Dam Stability below.
*Hydrology and Hydraulics	Spillway design calculations by H. G. Spaw of the U. S. Steel Corporation.
*Dam Stability	Embankment stability calculations by H. G. Spaw of the U. S. Steel Corporation.
Seepage Studies	None available.
Materials Investigations, Borings Records, Laboratory, Field	None available.

ITEM	REMARKS
Post-Construction Surveys of Dam	None available.
Borrow Sources	None reported.
Monitoring Systems	None reported.
Modifications	None reported.
High Pool Records	None available.
Post-Construction Engineering Studies and Reports	None available.
Maintenance, Operation, Records	None available.
**Spillway - Plan Sections Details	See Design Drawings above.
Operating Equipment Plans and Details	None available.
**Specifications	"United States Steel Corporation-Raw Materials and Lake Shipping-Frick District-Specification No. 193-6232-5 Refuse Disposal Area II at Maple Creek Mine", dated 16 November 1976.

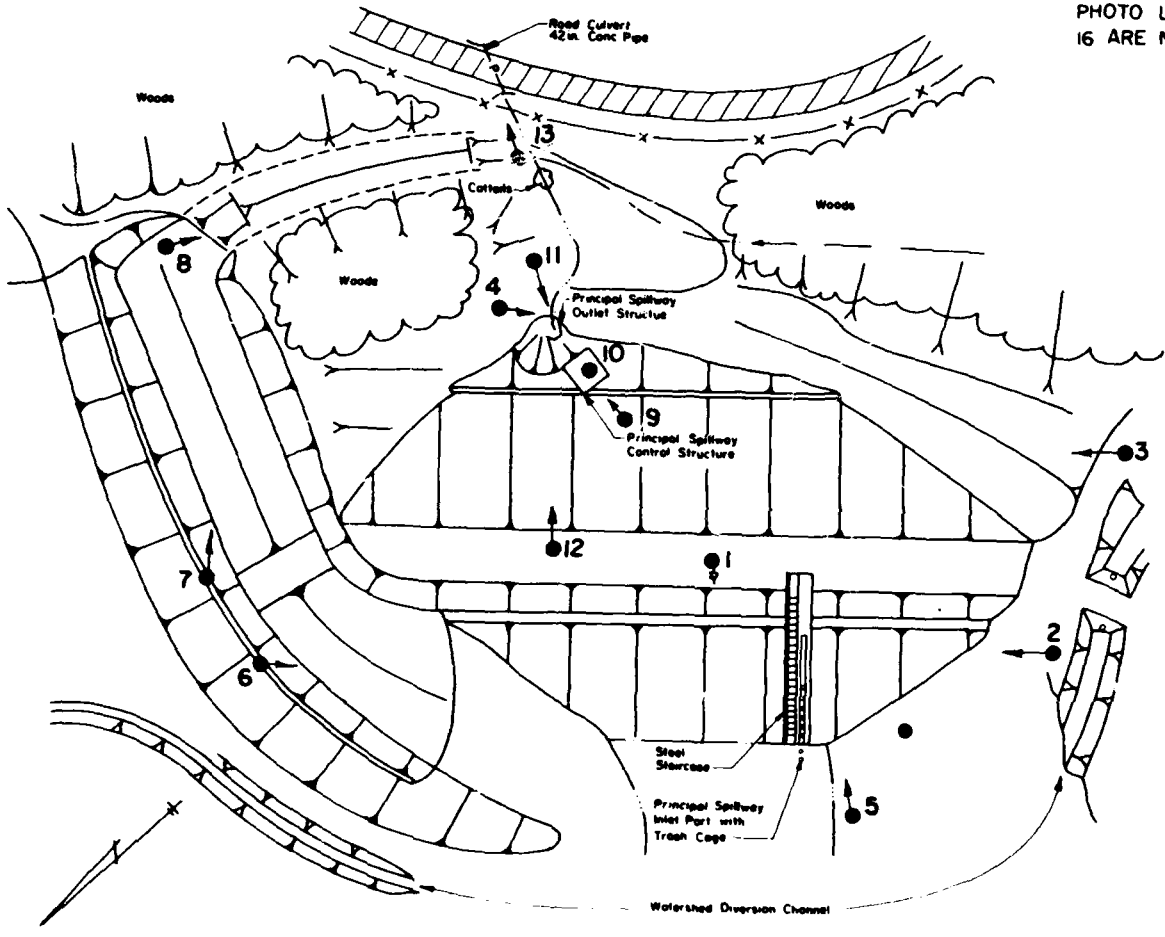
ITEM	REMARKS
Construction Reports	None available.
Prior Accidents or Failure of Dam Reports	None reported.
*Miscellaneous	"Application for Encroachment Permit" to the Program Services Section, Bureau of Water Quality Management, dated 21 May 1973. Miscellaneous correspondence between local residents and the Bureau of Water Quality Management relating to permit status. "Permit" to United States Steel Corporation to construct two desilting basins on tributaries to Pigeon Creek, dated 22 June 1973. Correspondence between U. S. Steel Corporation and PennDER Division of Dams and Encroachments relating to dam design requirements. "Permit" to United States Steel Corporation to construct and maintain two dams across an unnamed tributary to Pigeon Creek . . ., dated 19 November 1973. Miscellaneous correspondence between PennDER and U. S. Steel Corporation related to permit revisions and dam construction. "Dam Completion Report", by R. R. Godard, Chief Engineer, Frick District, U. S. Steel Corporation, dated 4 November 1977.

*Information and data may be obtained from the PennDER, Harrisburg, Pennsylvania.
**Information provided by U. S. Steel Corporation.

APPENDIX C

PHOTOGRAPHS

PHOTO LOCATIONS 14, 15 AND 16 ARE NOT SHOWN

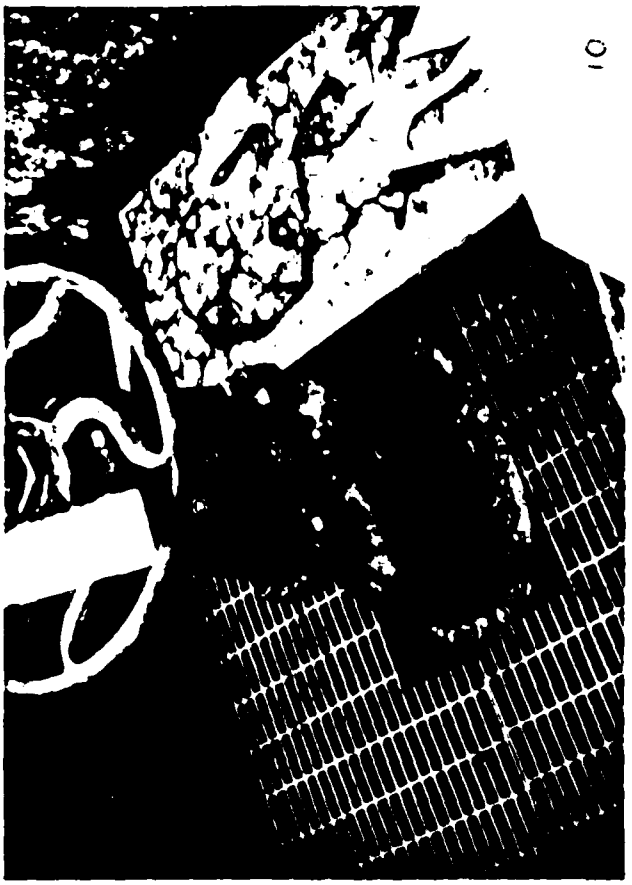


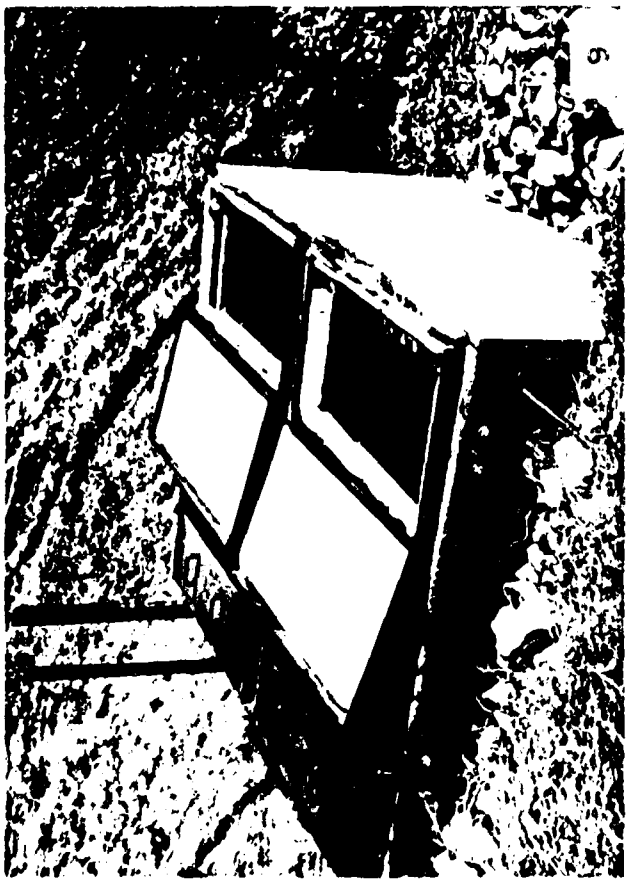
DATE: MARCH 1981	SALT POND A NATIONAL DAM INSPECTION PROGRAM	PHOTO KEY MAP
SCALE: NONE		
DR: JF CK:	A. C. ACKENHEIL & ASSOCIATES, INC. CONSULTING ENGINEERS PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.	
DWG. NO. 80138C		

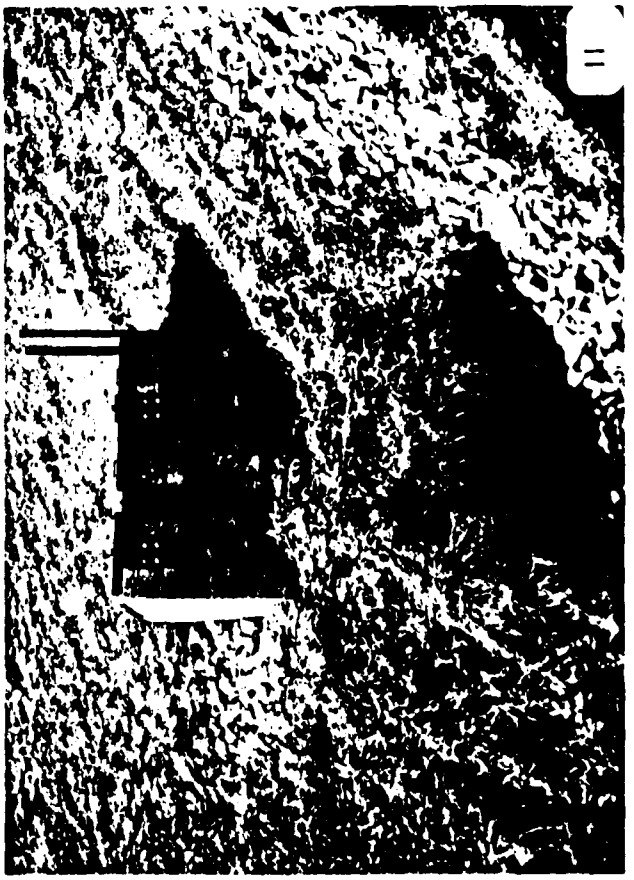
SILT POND A

SILT POND A

SILT POND A







SILT POND A

PHOTOGRAPH DESCRIPTIONS

Photo 1 Reservoir Overview taken from embankment crest.

Photo 2 Upstream Embankment Slope, Overview showing the principal spillway (foreground), erosion protection blanket and emergency spillway entrance.

Photo 3 Downstream Embankment Slope, Overview showing the embankment crest and principal spillway control structure.

Photo 4 Downstream Embankment Toe showing the principal spillway control and outlet structures.

Photo 5 Principal Spillway Intake Structure with intake ports and access stairway.

Photo 6 Emergency Spillway Entrance

Photo 7 Emergency Spillway Discharge Channel

Photo 8 Emergency Spillway Discharge Channel-Lower End

Photo 9 Principal Spillway Control Structure. Hatches are normally closed.

Photo 10 Principal Spillway Control Valve and Handwheel

Photo 11 Principal Spillway Control and Outlet Structure

Photo 12 Principal Spillway Discharge Channel, Overview

Photo 13 Highway Culvert channeling flow beneath township road.

Photo 14 Watershed Diversion Channel in right portion of watershed.

Photo 15 Downstream Hazards

Photo 16 Downstream Hazard

APPENDIX D

HYDROLOGY AND HYDRAULICS ANALYSES

APPENDIX D
HYDROLOGY AND HYDRAULICS

Methodology: The dam overtopping analysis was accomplished using the systemized computer program HEC-1 (Dam Safety Version), July 1978, prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California. A brief description of the methodology used in the analysis is presented below.

1. Precipitation: The Probable Maximum Precipitation (PMP) is derived and determined from regional charts prepared from past rainfall records including "Hydrometeorological Report No. 33" prepared by the U.S. Weather Bureau.

The index rainfall is reduced from 10% to 20% depending on watershed size by utilization of what is termed the HOP Brook adjustment factor. Distribution of the total rainfall is made by the computer program using distribution methods developed by the Corps.

2. Inflow Hydrograph: The hydrologic analysis used in development of the overtopping potential is based on applying a hypothetical storm to a unit hydrograph to obtain the inflow hydrograph for reservoir routing.

The unit hydrograph is developed using the Snyder method. This method requires calculation of several key parameters. The following list gives these parameters, their definition and how they were obtained for these analyses.

Parameter	Definition	Where Obtained
Ct	Coefficient representing variations of watershed	From Corps of Engineers*
L	Length of main stream channel	From U.S.G.S. 7.5 minute topographic map
Lca	Length on main stream to centroid of watershed	From U.S.G.S. 7.5 minute topographic map
Cp	Peaking coefficient	From Corps of Engineers*
A	Watershed size	From U.S.G.S. 7.5 minute topographic map

3. Routing: Reservoir routing is accomplished by using Modified Puls routing techniques where the flood hydrograph is routed through reservoir storage. Hydraulic capacities of the outlet works, spillways and the crest of the dam are used as outlet controls in the routing.

The hydraulic capacity of the outlet works can either be calculated and input or sufficient dimensions input and the program will calculate an elevation-discharge relationship.

Storage in the pool area is defined by an area-elevation relationship from which the computer calculates storage. Surface areas are either planimetered from available mapping or U.S.G.S. 7.5 minute series topographic maps or taken from reasonably accurate design data.

4. Dam Overtopping: Using given percentages of the PMF the computer program will calculate the percentage of the PMF which can be controlled by the reservoir and spillway without the dam overtopping.

---

*Developed by the Corps of Engineers on a regional basis for Pennsylvania.

HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Predominately grass and brushland with some woods. No major development noted.

ELEVATION-TOP NORMAL POOL (STORAGE CAPACITY): Varies (varies)

ELEVATION-TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 1042.9 (55 acre-feet)

ELEVATION-MAXIMUM DESIGN POOL: 1042.0

ELEVATION-TOP DAM: 1042.9

OVERFLOW SECTION

a. Elevation 1039.4
b. Type Trapezoidal Open Channel
c. Width 48 feet
d. Length 35 feet (average)
e. Location Spillover Left Abutment
f. Number and Type of Gates None

OUTLET WORKS (Principal Spillway)

a. Type 16 inch diameter stainless steel pipe
b. Location Near center of dam
c. Entrance Invert Varies
d. Exit Inverts 1004.0
e. Emergency Drawdown Facilities None

HYDROMETEOROLOGICAL GAGES

a. Type None
b. Location N/A
c. Records None

MAXIMUM REPORTED NON-DAMAGING DISCHARGE None reported

HEC-1 DAM SAFETY VERSION
HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: Silt Pond A	NDI NO. PA 00823
Probable Maximum Precipitation (PMP)	24.2*
Drainage Area "Zone 7"	0.23 sq. mi.
Reduction of PMP Rainfall for Data Fit Reduce by 20%, therefore PMP rainfall	0.8 (24.2) =19.4 inches
Adjustments of PMF for Drainage Area	
6 hrs.	102%
12 hrs.	120%
24 hrs.	130%
48 hrs.	140%
Snyder Unit Hydrograph Parameters	
Zone	29**
C_p	0.5
C_t	1.6
L	0.72 mile
L_{ca}	0.38 mile
$t_p = C_t (L \cdot L_{ca})^{0.3}$ =	1.08 hours
Loss Rates	
Initial Loss	1.0 inch
Constant Loss Rate	0.05 inch/hour
Base Flow Generation Parameters	
Flow at Start of Storm	1.5 cfs/sq.mi=0.35 cfs
Base Flow Cutoff	0.05 x Q peak
Recession Ratio	2.0
Overflow Section Data	
Crest Length	48 feet
Freeboard	3.5 feet
Discharge Coefficient	3.09
Exponent	1.5
Discharge Capacity	971 cfs

* Hydrometerological Report 33

**Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients (C_p and C_t).

ACKENHEIL & ASSOCIATES
GEO Systems, Inc.
1000 Banksville Road
PITTSBURGH, PA 15216
(412) 531-7111

Sheet _____ of _____

Job MAPLE CREEK Refuse II Pond A Job No 80138C

Subject DATA INPUT

Made By JPH Date 11/20/80 Checked [illegible] Date 2/21/81

Loss Rate and Base Flow Parameters

As Recommended by Corps of Engineers, Baltimore District

STRTL = 1 inch
CNSTL = 0.05 in/hr
STRTQ = 1.5 cfs/mi^2
QRCSN = .05 (5% of Peak Flow)
RTIOR = 2.0

Elevation - Area - Capacity Relationships

From USGS 7.5 min Quad, Pennsylvania, and field inspection Data.

AT elevation 1045
Initial Storage equals 68.2 acre-feet
Pond Surface Area 6.6 acres

AT elevation 1050 Area = 8.4 acres

From Conic Method of Reservoir Volume
Flood Hydrograph Package (HEC-1)
Dam Safety Version (Users manual)

$$H = 3V/A = \frac{3(68.2)}{6.6} = 31 \text{ feet}$$

Elevation where area equals zero
1045 - 31 = 1014

$A	0.	6.6	8.4
$E	1014	1045	1050

ACKENHEIL & ASSOCIATES
GEO Systems, Inc.
1000 Banksville Road
PITTSBURGH, PA 15216
(412) 531-7111

Sheet _____ of _____

Job MAPLE Creek Refuse Area Pond A Job No 80138C

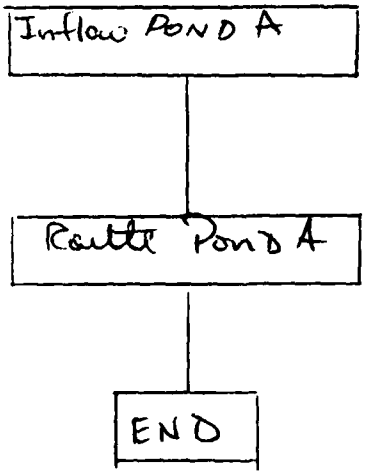
Subject Data Input

Made By JPH Date 11/20/80 Checked JEB Date 2/21/81

Overtop Parameters

Top of Dam Elevation (Minimum)	= 1042.9
Length of Dam	= 400 feet
Coefficient of Discharge	= 3.09

Program Schedule



```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1978
  LAST MODIFICATION  26 FEB 79
**********
    1              A1       NATIONAL PROGRAM FOR THE INSPECTION OF NON FEDERAL DAMS
    2              A2       HYDROLOGIC AND HYDRAULIC ANALYSIS OF REFUSE AREA II SILT POND A
    3              A3       PROBABLE MAXIMUM FLOOD PMF/UNIT HYDROGRAPH BY SNYDER'S METHOD
    4              B    300       0      10       0       0       0       0       0      -4       0
    5              B1     5
    6              J      1       2       1
    7              J1    1.      .5
    8              K      0       1                                               1
    9              K1       INFLOW HYDROGRAPH FOR REFUSE AREA II SILT POND A
   10              M      1       1    0.23            0.23                                       1
   11              P             24.2     102     120     130     140
   12              T                                                       1.0     .05
   13              W   1.08    0.50
   14              X   -1.5   -0.05     2.0
   15              K      1       2                                               1
   16              K1       ROUTING AT REFUSE AREA II SILT POND A
   17              Y                                       1       1
   18              Y1     1                                               -1039.4
   19              $A    0.     6.6     8.4
   20              $E 1014.   1045.   1050.
   21              $$1039.4     48.    3.09     1.5
   22              $D1042.9    3.09     1.5    400.
   23              $L     1.     30.    325.    367.    400.
   24              $V1042.9  1044.5  1045.6  1045.8  1047.4
   25              K     99
   26              A
   27              A
   28              A
   29              A
   30              A

                        PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

                                RUNOFF HYDROGRAPH AT          1
                                ROUTE HYDROGRAPH TO           2
                                END OF NETWORK

**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1978
  LAST MODIFICATION  26 FEB 79
**********

RUN  DATE:  8 JAN 81
RUN  TIME: 13.43.15

                        NATIONAL PROGRAM FOR THE INSPECTION OF NON FEDERAL DAMS
                        HYDROLOGIC AND HYDRAULIC ANALYSIS OF REFUSE AREA II SILT POND A
                        PROBABLE MAXIMUM FLOOD PMF/UNIT HYDROGRAPH BY SNYDER'S METHOD

                                        JOB SPECIFICATION
                      NQ      NHR     NMIN     IDAY      IHR     IMIN    METRC     IPLT     IPRT    NSTAN
                     300        0       10        0        0        0        0        0       -4        0
                                        JOPER      NWT    LROPT    TRACE
                                            5        0        0        0

                                MULTI-PLAN ANALYSES TO BE PERFORMED
                                    NPLAN= 1 NRTIO= 2 LRTIO= 1
                           RTIOS=    1.00    0.50

          **********          **********          **********          **********          **********
```

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH FOR REFUSE AREA II SILT POND A

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	0.23	0.0	0.23	0.0	0.0	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.0	24.20	102.00	120.00	130.00	140.00	0.0	0.0

TRSPC COMPUTED BY THE PROGRAM IS 0.800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.0	0.0	1.00	0.0	0.0	1.00	1.00	0.05	0.0	0.0

UNIT HYDROGRAPH DATA

TP= 1.08 CP=0.50 NTA= 0

RECESSION DATA

STRTQ= -1.50 QRCSN= -0.05 RTIOR= 2.00

UNIT HYDROGRAPH 51 END-OF-PERIOD ORDINATES, LAG= 1.09 HOURS, CP= 0.50 VOL= 1.00

4.	13.	27.	43.	56.	66.	69.	66.	59.	52.
47.	42.	37.	33.	30.	26.	24.	21.	19.	17.
15.	13.	12.	11.	10.	9.	8.	7.	6.	5.
5.	4.	4.	3.	3.	3.	2.	2.	2.	2.
2.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.									

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	27.10	24.68	2.42	21821.
										(688.)	(627.)	(61.)	(617.90)

*********** *********** *********** *********** ***********

HYDROGRAPH ROUTING

ROUTING AT REFUSE AREA II SILT POND A

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.0	0.0	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.0	0.0	0.0	-1039.	0

SURFACE AREA=	0.	7.	8.
CAPACITY=	0.	68.	106.
ELEVATION=	1014.	1045.	1050.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
1039.4	48.0	3.1	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1042.9	3.1	1.5	400.

CREST LENGTH AT OR BELOW ELEVATION	1.	30.	325.	367.	400.
	1042.9	1044.5	1045.6	1045.8	1047.4

PEAK OUTFLOW IS 677. AT TIME 40.83 HOURS

PEAK OUTFLOW IS 335. AT TIME 40.83 HOURS

*********** *********** *********** *********** ***********

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 1.00	 RATIO 2 0.50
HYDROGRAPH AT	1	0.23	1	692.	346.
	(	0.60)	(	19.60)(	9.80)(
ROUTED TO	2	0.23	1	677.	335.
	(	0.60)	(	19.17)(	9.50)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1039.40	1039.40	1042.90
STORAGE	38.	38.	55.
OUTFLOW	0.	0.	971.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1042.15	0.0	51.	677.	0.0	40.83	0.0
0.50	1041.12	0.0	46.	335.	0.0	40.83	0.0

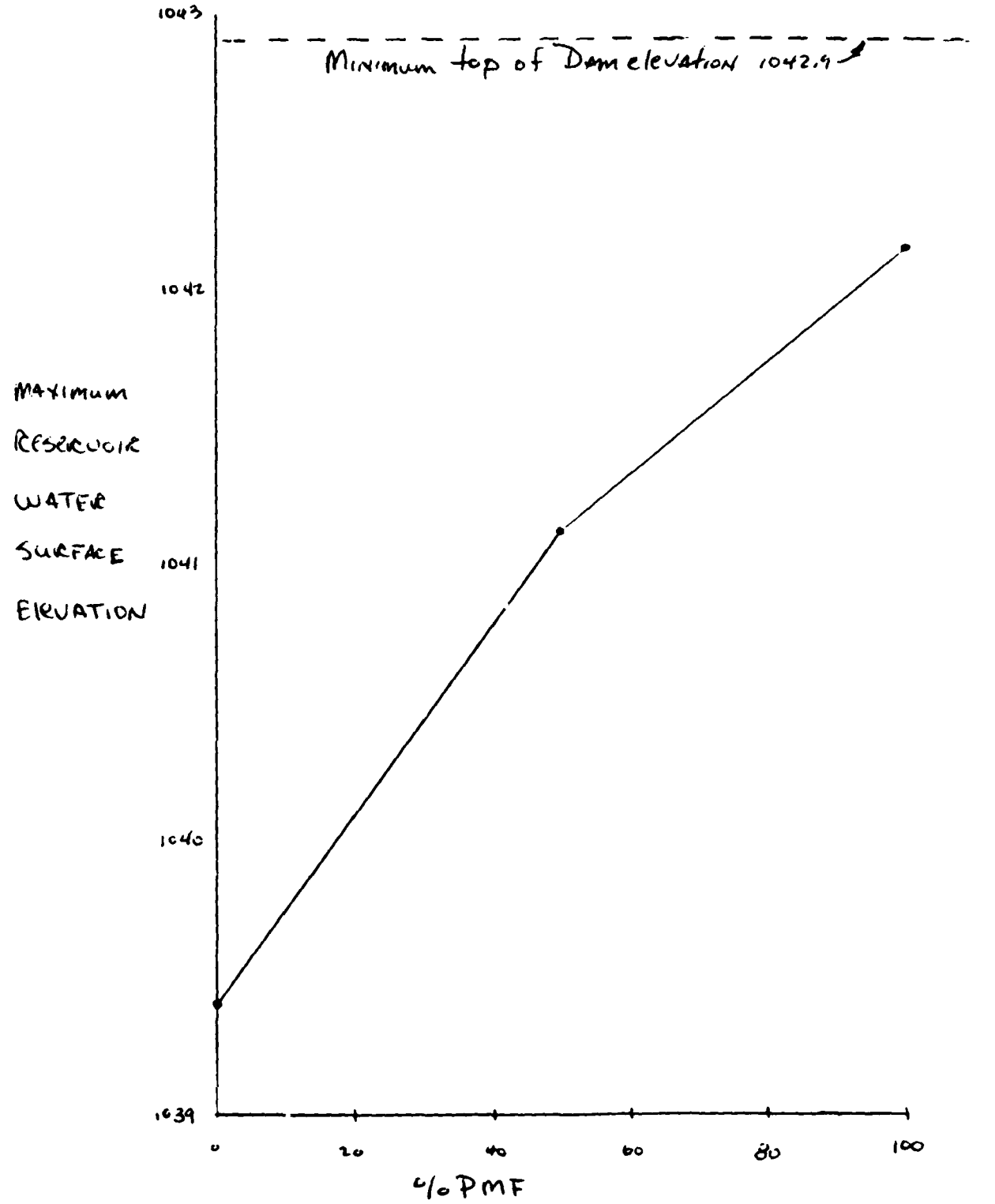
Sheet _____ of _____

ACKENHEIL & ASSOCIATES
GEO Systems, Inc.
1000 Banksville Road
PITTSBURGH, PA 15216
(412) 531-7111

Job MAPLE CREEK REFUSE II POND A Job No 80138C

Subject HYDROLOGIC PERFORMANCE PLOT

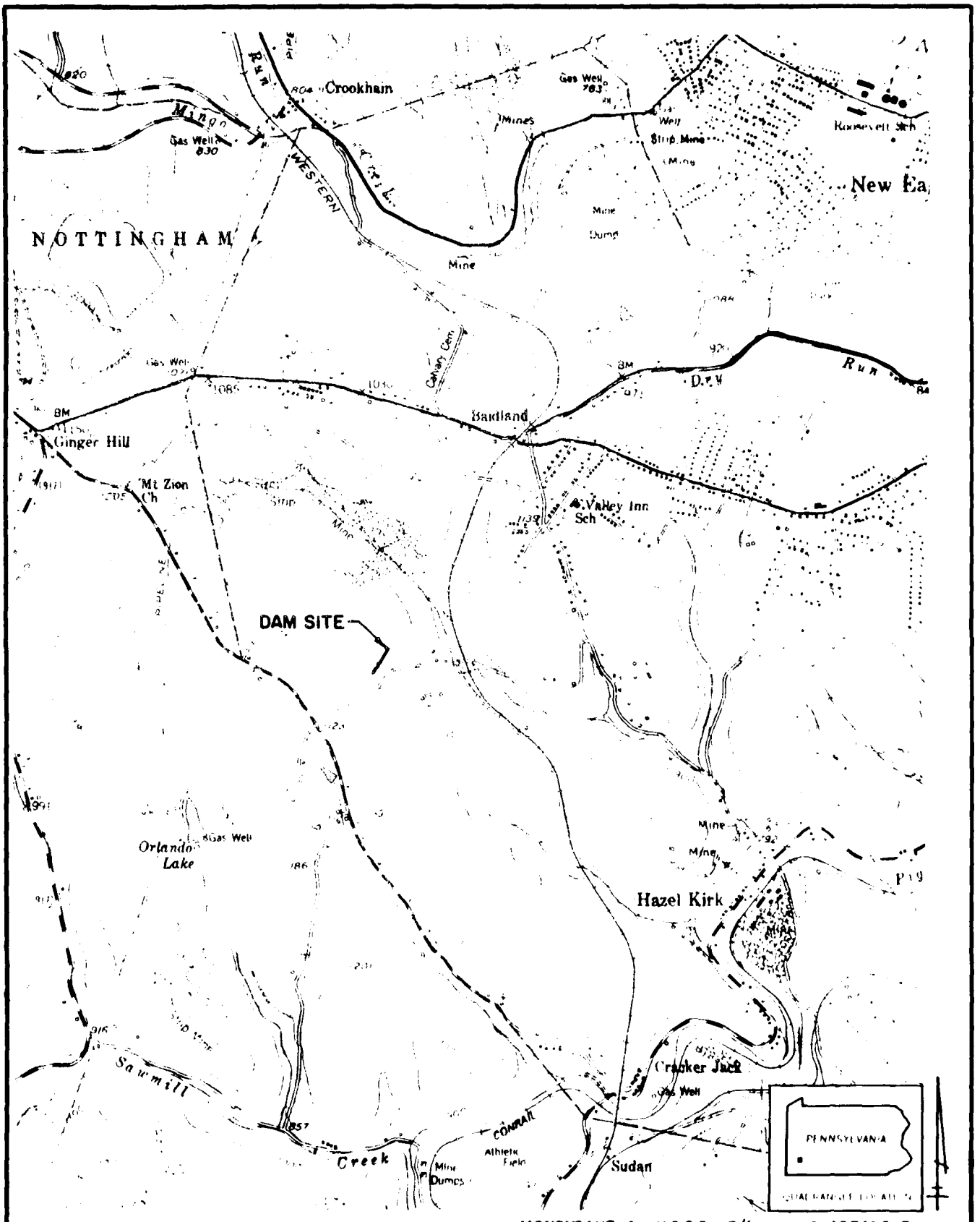
Made By JPH Date 11/20/80 Checked KBA Date 1-15-81



APPENDIX E

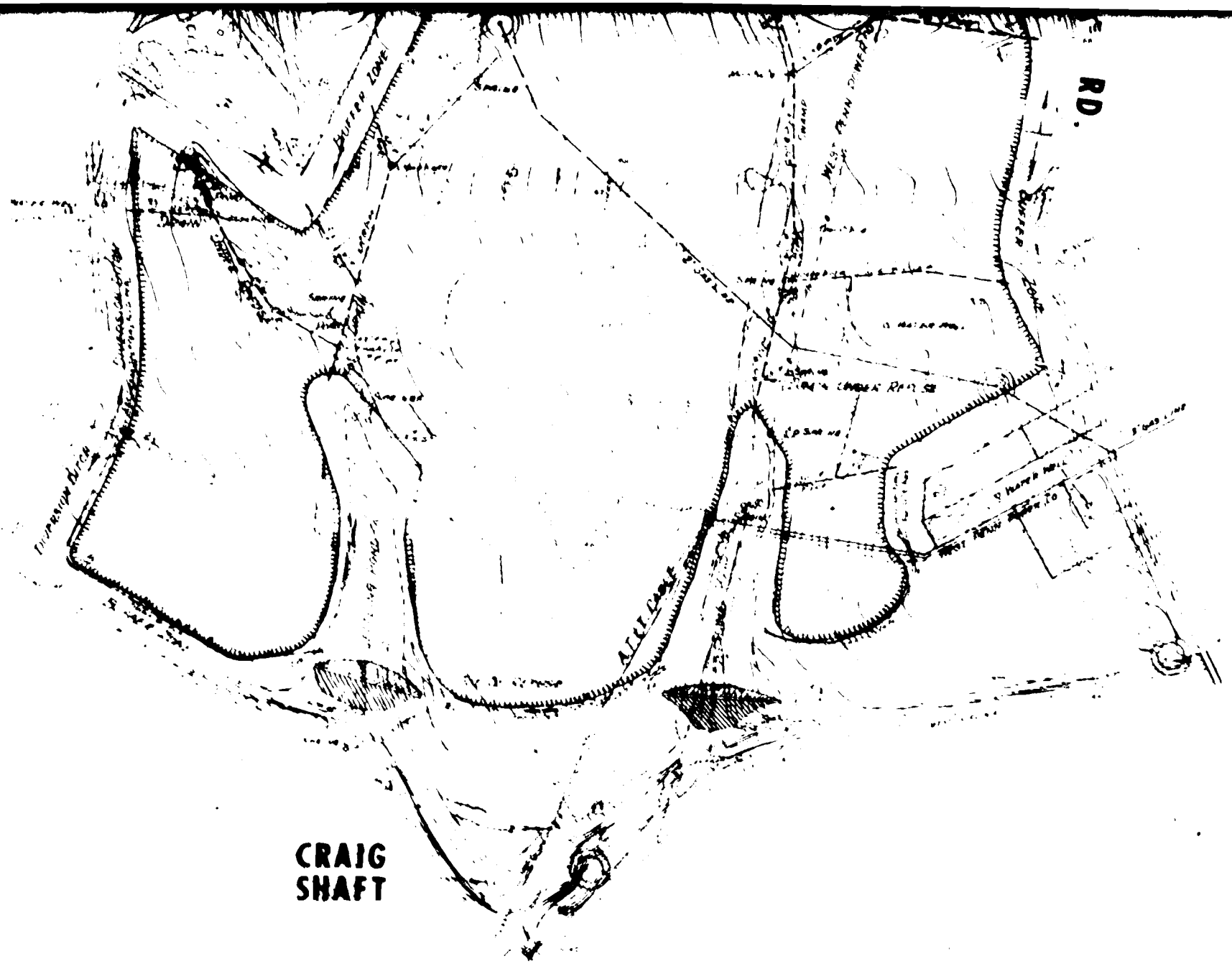
PLATES

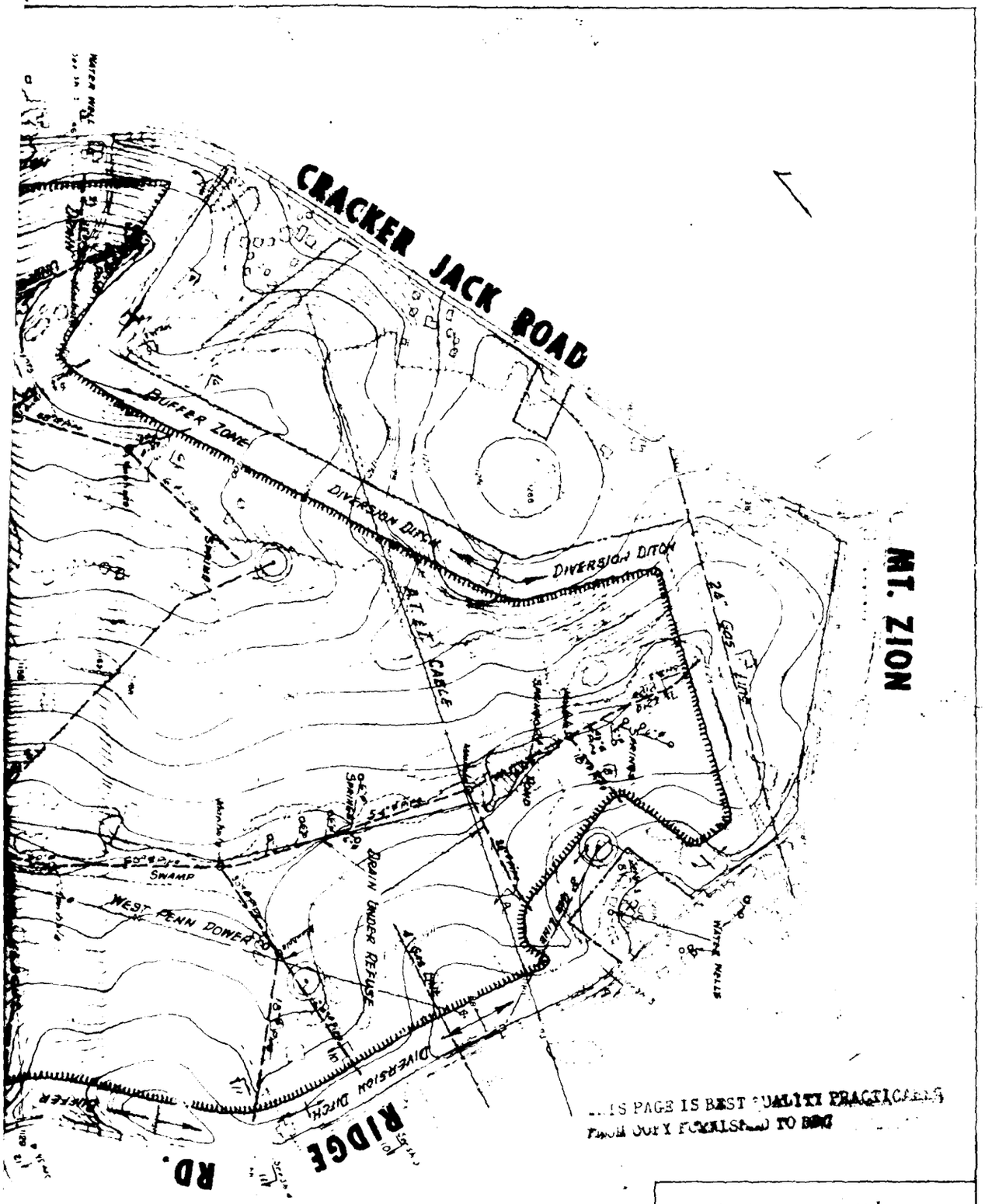
LIST OF PLATES



MONONGAHELA U.S.G.S. 7½ min. QUADRANGLE

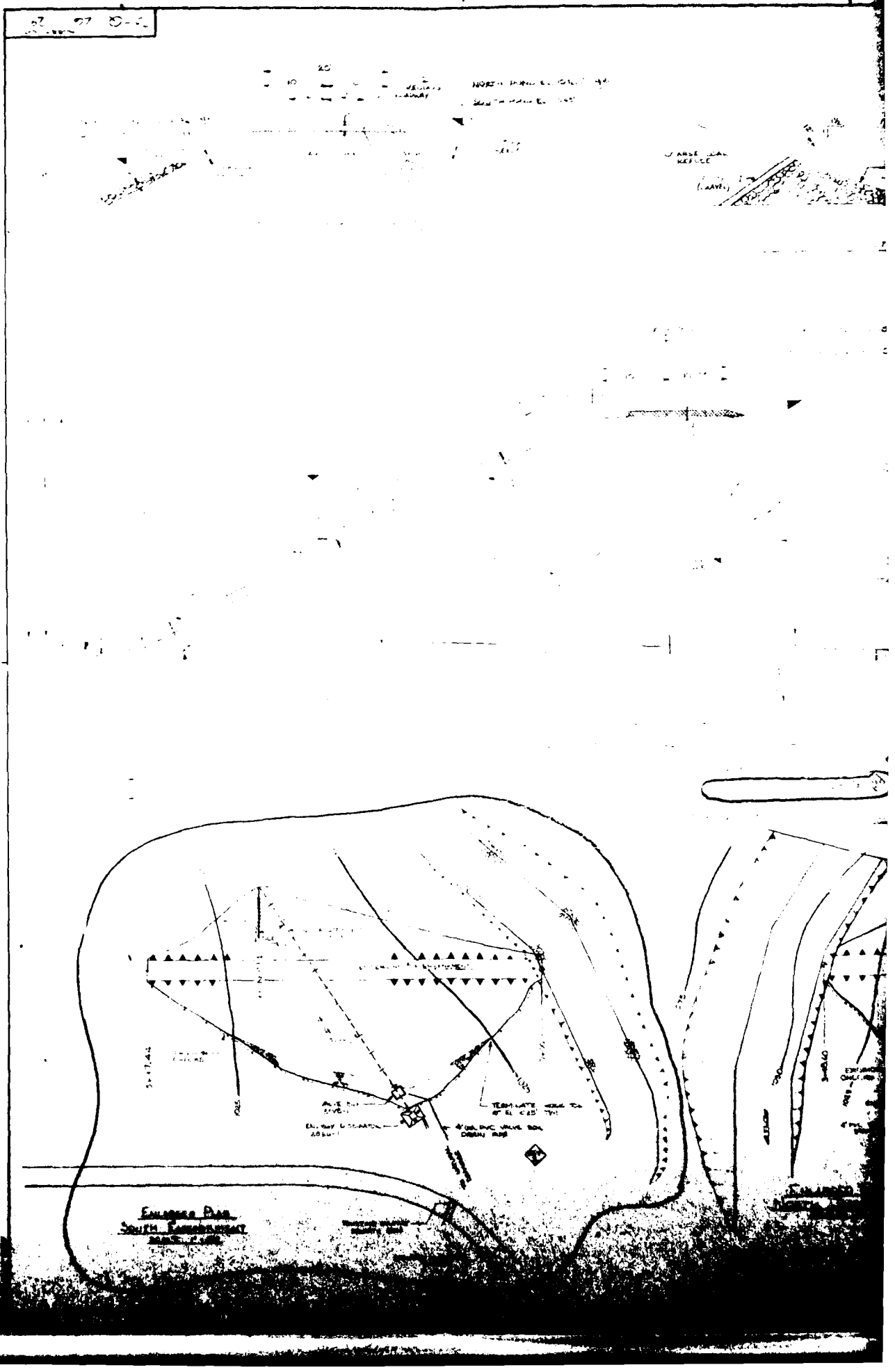
DATE: MARCH 1981	SILT POND A NATIONAL DAM INSPECTION PROGRAM	REGIONAL VICINITY MAP
SCALE. 1" = 2000'		
DR: JF CK:	ACKENHEIL & ASSOCIATES CONSULTING ENGINEERS GEO SYSTEMS, INC.	
PLATE I	1000 BANKSVILLE RD / PITTSBURGH, PA 15216	

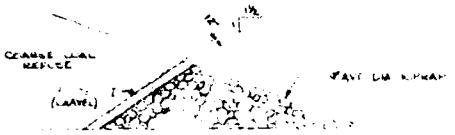

RD.
CRAIG
SHAFT

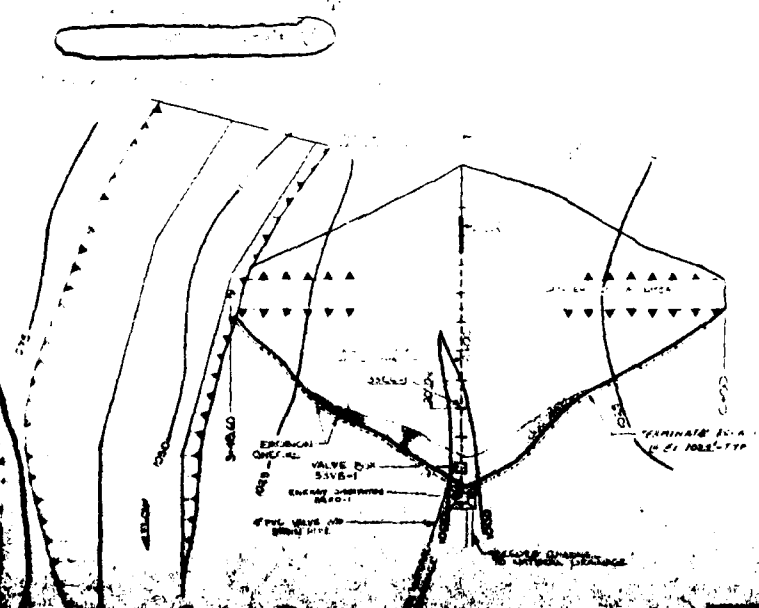


UNITED STATES STEEL CORPORATION
FRICK DISTRICT UNIONTOWN, PA.

PLATE 11



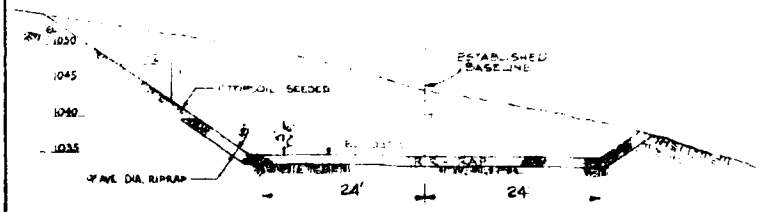




MAPLE CREEK MINE
REFUSE DISPOSAL AREA #2
TYPICAL EMBANKMENT SECTION AND
PLAN OF DECANT LOCATION

UNITED STATES STEEL CORPORATION
PITTSBURGH, PA.

PLATE III



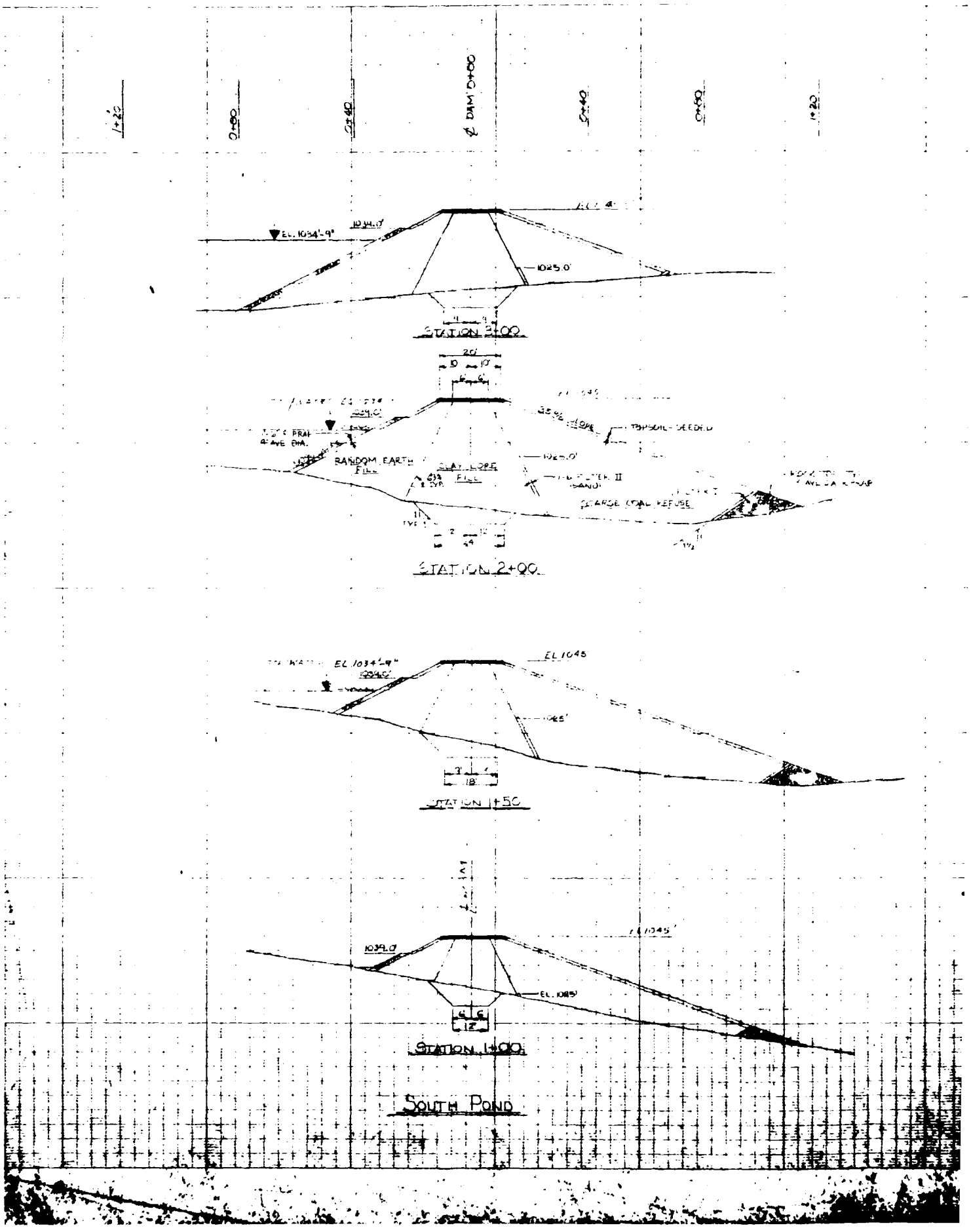
SECTION 1-1
STA. 1+62.00

SECTION 2-2

MAPLE CREEK MINE
REFUSE DISPOSAL AREA #2
SOUTH POND SPILLWAY and DETAILS

UNITED STATES STEEL CORPORATION

PLATE IV


1+25
0+00
0+40
℄ DAM 0+00
0+40
0+60
1+20
EL. 1034'-9"
1034.0'
1025.0'
STATION 3+00
20'
10
10
6
6
1034.0'
35%
SLOPE
TOPSOIL - SEEDED
RANDOM EARTH FILL
CLAY CORE FILL
633 C.Y. FILL
1025.0'
SANDY
COARSE COAL REFUSE
STATION 2+00
EL. 1034'-9"
1034.0'
EL. 1045
1025'
18
STATION 1+50
EL. 1045'
1039.0'
EL. 1025'
6
6
12'
STATION 1+00
SOUTH POND

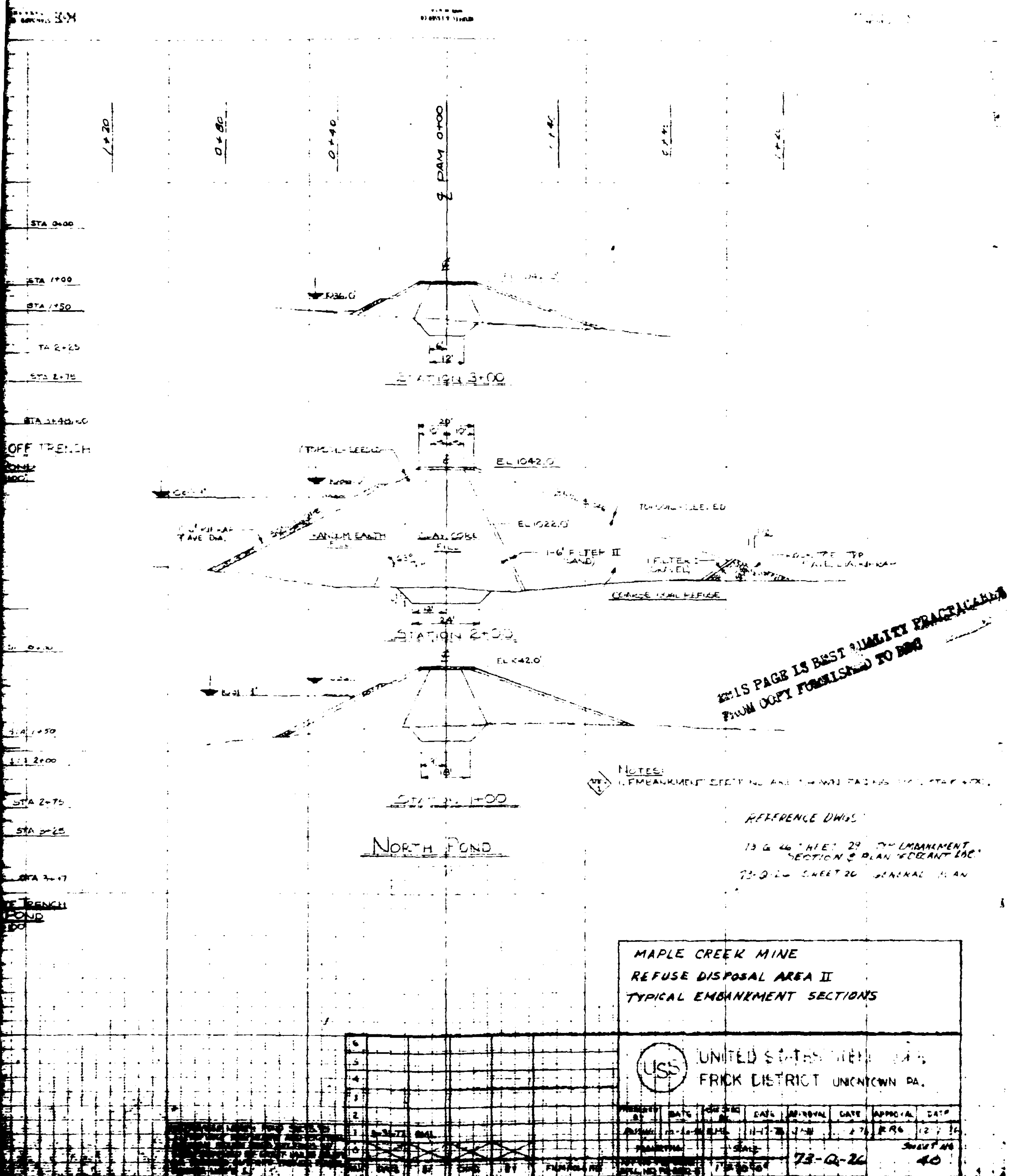
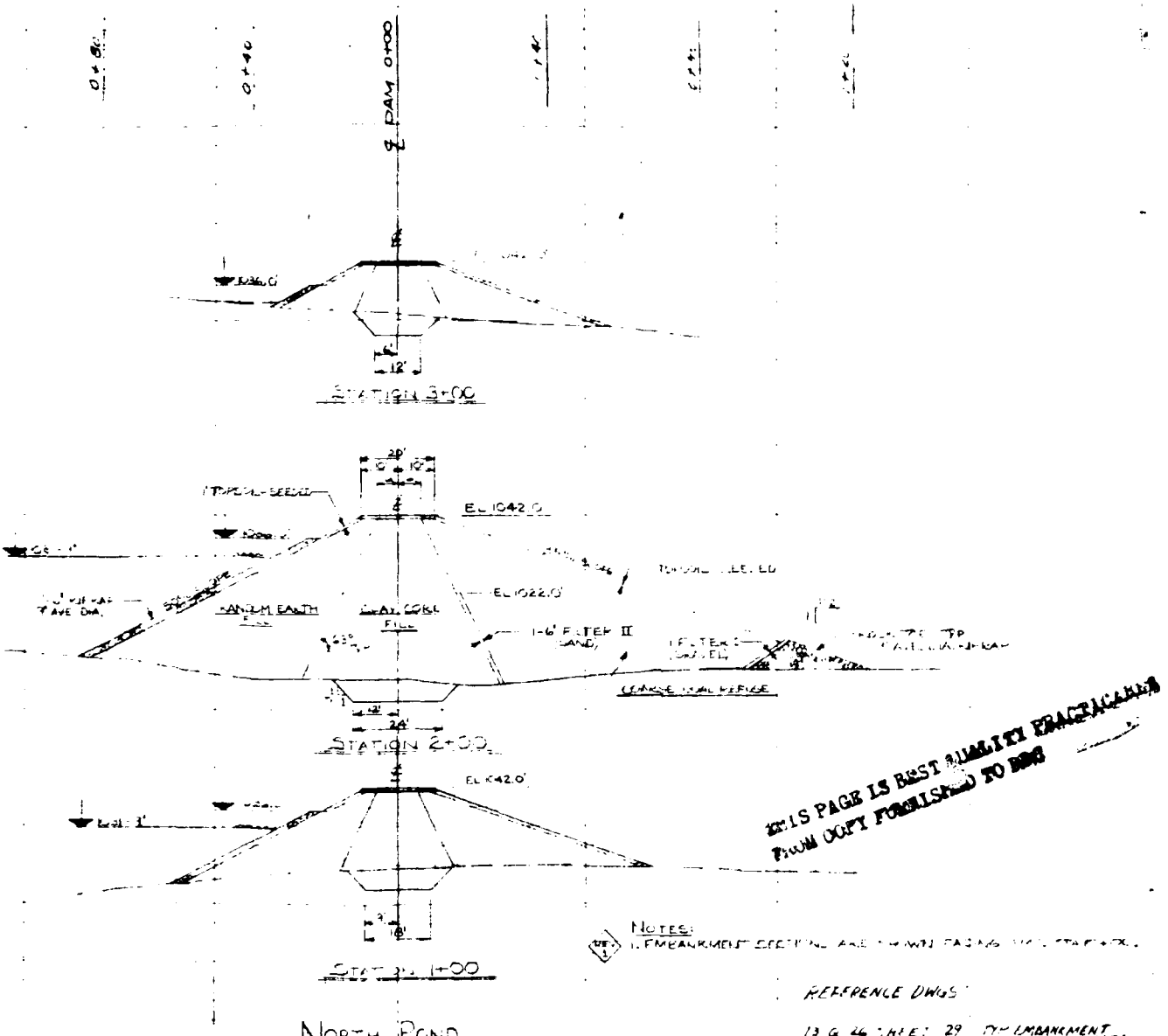


PLATE V



NOTES:
1. EMBANKMENT SECTIONS ARE SHOWN FACING [illegible] STATIONS.

REFERENCE DWGS

13 G 46 SHEET 29 DAM EMBANKMENT SECTION & PLAN FOR CONSTRUCTION

73-Q-24 SHEET 20 GENERAL PLAN

NORTH POND

MAPLE CREEK MINE
REFUSE DISPOSAL AREA II
TYPICAL EMBANKMENT SECTIONS

UNITED STATES STEEL CORP.
FRICK DISTRICT UNIONTOWN PA.

DESIGNED BY	DATE	CHECKED BY	DATE	APPROVAL	DATE	APPROVAL	DATE
[illegible]	10-24-73	[illegible]	11-11-73	[illegible]	12-7-73	[illegible]	12-7-73

SCALE: 1" = 100'
73-Q-26
SHEET NO. 40

PLATE V

APPENDIX F

GEOLOGY

GEOLOGY

Geomorphology

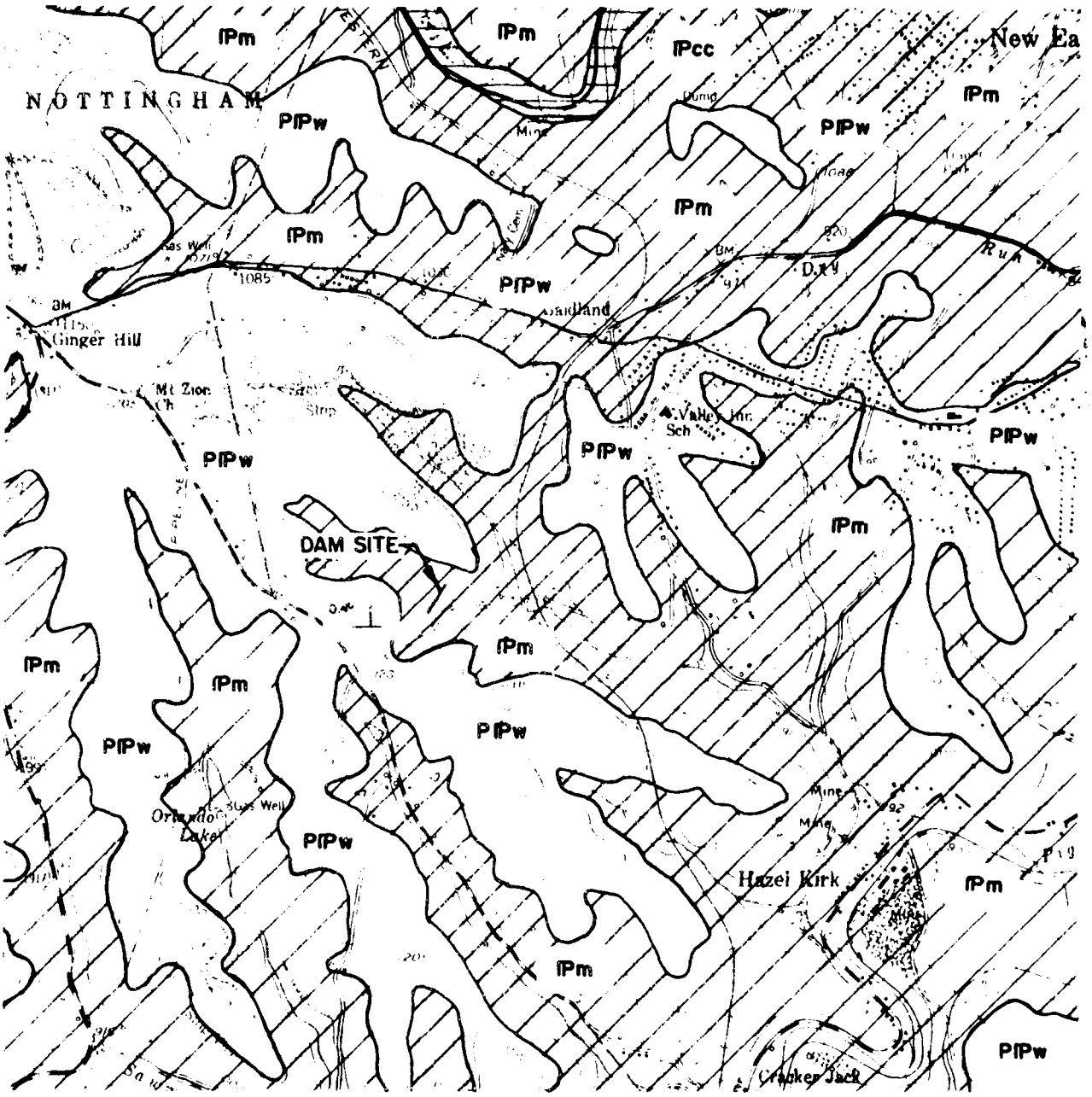
Silt Pond A is located within the Pittsburgh Plateau section of the Appalacian Plateau Physiographic Province. This area is characterized by essentially flat lying sedimentary rocks which have been deeply cut by streams to form steep sided valleys. The Pond is located near the head of an unnamed tributary to Pigeon Creek. The valley bottom of the unnamed tributary is about 200 feet below the adjacent ridges. These rounded hilltops are at Elevation 1100 to 1200 feet, and in a regional sense are part of a broad, undulating plateau.

Stratigraphy

General: Silt Pond A is located along the stratigraphic boundary of the Monongahela Group of Pennsylvania Age and the Dunkard Group of Permian Age. The Waynesburg Coal Seam, which marks the stratigraphic boundary between these two groups, outcrops near the dam site.

Mining Activity: The Waynesburg Coal Seam has been strip mined extensively in this area. The Pittsburgh Coal Seam, located about 300 feet below the dam, has been extensively deep mined.

Rock Types: Bedrock, which immediately underlies the site, consists of sandstones and shales.



MONONGAHELA QUADRANGLE, WASHINGTON COUNTY, PENNSYLVANIA

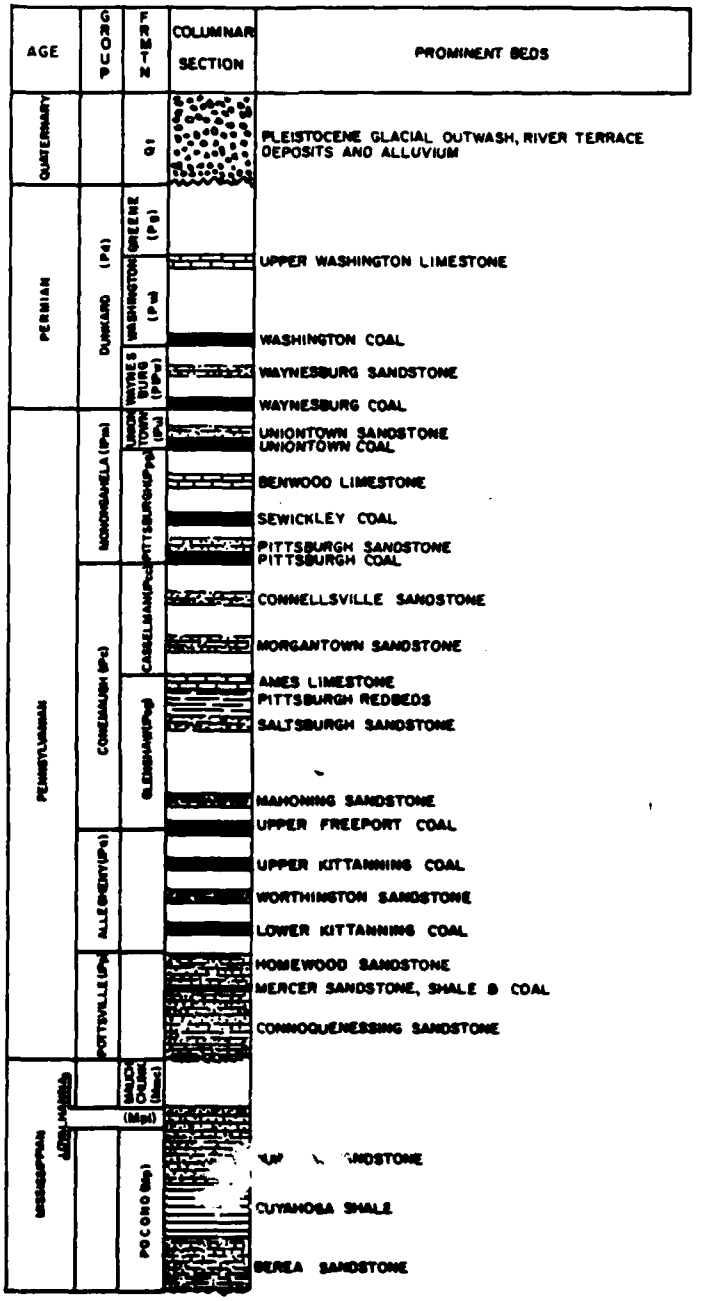
SCALE: 0 ½ MILE 1:24000

CONTOUR INTERVAL 20 FT. DATUM IS MEAN SEA LEVEL

——— FORMATION CONTACT

DATA OBTAINED FROM PENNSYLVANIA TOPOGRAPHIC AND GEOLOGIC SURVEY GREATER PITTSBURGH REGION GEOLOGIC MAP AND CROSS SECTIONS, 1975 and GREATER PITTSBURGH REGION STRUCTURE CONTOUR MAP, 1975

DATE. MARCH, 1981	SILT POND A NATIONAL DAM INSPECTION PROGRAM	GEOLOGIC MAP
SCALE: 1"=2000'		
DR: JF CK:	ACKENHEIL & ASSOCIATES CONSULTING ENGINEERS GEO SYSTEMS, INC 1000 BANKSVILLE RD / PITTSBURGH PA 15216	



DATE: MARCH 1981	SILT POND A	GEOLOGIC COLUMN
SCALE: 1"=360	NATIONAL DAM INSPECTION PROGRAM	
DR: JF CK: JEB	ACKENHEIL & ASSOCIATES CONSULTING ENGINEERS	
DWG. NO.	GEO SYSTEMS, INC. 1000 BANKSVILLE RD/PITTSBURGH PA 15216	

END

DATE
FILMED

6-81

DTIC